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OF

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VOLUME XXV.

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ARCHIVES OF OPHTHALMOLOGY

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the Report on the Progress of Ophthalmology. The report is intended to furnish a *complete, systematic, and early* review of the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement :

Dr. ST. BERNHEIMER, of Vienna.

1. *General Ophthalmological Literature :*
   a.—Text-books (not abstracts, but notes pointing out what is new and characteristic).
   b.—Monographs and papers on historical, statistical, and general subjects ; reports on societies and hospitals.
   c.—Periodicals on our specialty (short notices of their character, time and place of publication, the titles of the original papers, with the names of their authors).

2. *General Pathology, Diagnosis, and Therapeutics,* including new instruments, apparatus, and remedies.
3. *Normal Anatomy and Physiology,* including color-blindness.

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1. *Anomalies of Refraction and Accommodation.*
2. *Eyelids.*
3. *Lachrymal Apparatus.*
4. *Muscles and Nerves.*
5. *Orbit and Adjacent Cavities.*
6. *Conjunctiva, Cornea, Sclerotic.*
7. *Injuries and Foreign Bodies of these parts.*

Dr. P. SILEX, Lecturer at the University of Berlin.

1. *Uveal Tract,* including glaucoma.
2. *Refracting Media,* including the lens.
3. *Retina and Optic Nerve.*
4. *Injuries and Foreign Bodies of these parts.*
5. *Ocular affections in connection with general diseases.*

In order to obtain complete and recent reviews on the non-German ophthalmological literature, special reporters have been selected for different countries, who will send monthly abstracts of all local ophthalmological publications to Dr. C. Horstmann, of Berlin, the editor of the Report. Dr. Horstmann will distribute these abstracts among the German reporters according to the above plan, in order to preserve the systematic arrangement which we think of paramount importance.

The special reporters are:

For America: Dr. SWAN M. BURNETT, 1770 Massachusetts Ave., Washington, D.C.

For Great Britain and Ireland: Dr. L. WERNER, 27 Upper Merrion Street, Dublin.

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For Holland: Dr. C. A. H. WESTHOFF, of Amsterdam.

In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology,—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or copies for reviewing, to one of the above-named reporters, or to the editors or publishers of the Archives, according to their convenience.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

EDITORS:

H. KNAPP, M.D.,
26 WEST 40TH STREET, NEW YORK.

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NOTICE TO CONTRIBUTORS.

The editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

1. As original communications the ARCHIVES can accept only such papers as have never been printed nor are intended to be printed in other journals. If a preliminary communication on the subject of a paper has been published, the author is requested to state this in the letter accompanying his manuscript. It is understood that contributors to these ARCHIVES and editors of other periodicals will make no abstracts of the original papers published in this journal without giving it due credit for the same.

2. Authors will receive gratuitously twenty-five reprints of their articles. If a greater number is desired,—notice of which should be given at the head of the manuscript,—only the additional cost of presswork and paper will be charged to the author.

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a. Write on one side of the paper only.

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4. Authors may receive proofs for revision if they will kindly return them without delay. We beg however to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them, to make, if possible, no alterations at all in their MSS., or, at least, to limit these to what is of essential importance.

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EDITORIAL NOTICE

The editor regrets the delay in the appearance of this and previous numbers of the ARCHIVES. He has made arrangements to avoid this in the future.

ARCHIVES OF OPHTHALMOLOGY.

OBSERVATIONS ON THE MACULA LUTEA.

By GEORGE LINDSAY JOHNSON, M.D. (Cantab.), F.R.C.S. (London).

HISTOLOGY OF THE HUMAN MACULA (*Continued*).

(*With eight microphotographs and two diagrams in the text.*)

B.—THE BACILLARY LAYER.

OF all the layers of the retina the bacillary layer is by far the most delicate, and the most susceptible to post-mortem changes, and that is no doubt why in so large a number of cases I have obtained specimens perfect throughout the retina with the sole exception of this layer, which can evidently only be preserved by instantaneous fixation and most careful subsequent preparation. It is moreover essential that the eyes should not only be healthy but should be obtained from the living subject. In no case have I been able to preserve the bacillary layer in eyes in any way diseased, or enucleated after death. The eyes of new-born children are likewise unsuitable, the retina being insufficiently developed.

The bacillary layer, when perfectly preserved, presents an appearance which differs so fundamentally from all the descriptions hitherto given that I hesitated to publish my results, until I found the appearance usually described to correspond to those of my own specimens in which the bacillary layer was obliquely cut, degenerated or disturbed, and until I had confirmed my observations by the microscopical examination of the eyes of several of the monkeys.

I have used various methods of preparation and staining in order to eliminate as far as possible any errors due to the

action of the reagents employed, and I systematically rejected all specimens in which I could not confirm the details of structure by more than one method of treatment.

I may here remark that the results I have been able to obtain by the Golgi and Ramon y Cajal methods have not been sufficiently uniform to justify my drawing conclusions from them. Moreover, specimens prepared according to these methods will not bear high magnification, and, therefore, cannot reveal the extremely minute structure of the retinal elements.

When treating of the hexagonal layer and describing the network which I termed the crystal-pigment plexus, I already stated that the bacillary layer was directly continuous with and organically bound to that plexus. In other words, I find that the established doctrine of rods and cones terminating by free ends is not only erroneous, but that on the contrary the rods and cones are in direct continuity with the hexagonal layer, through the above-mentioned plexus. Borysiekiewicz[1] seems to be the only author who has stated that the cones are of equal length with the rods. I not only find this confirmed, but I have been able to preserve the outer half of the bacillary layer intact, and this outer half varies materially in structure in different parts of the retina. This outer part of the bacillary layer breaks up in various ways in imperfectly preserved specimens, and it is probably this which has led observers to differ in opinion as to the shape of the ends of the rods and cones.

The bacillary layer—by which I understand that portion of the retina which extends from the membrana limitans externa to the pigment layer—can be described as consisting of two parts of nearly equal length, an inner or basal half and an outer or filamentous half, the latter being united to the crystal pigment plexus, which, as shown in my previous paper,[2] penetrates the hexagonal layer to terminate at or in the spherules.

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[1] "Weitere Untersuchungen über den feineren Bau der Netzhaut"—Denticke, Leipsig, u. Wien, 1894.

[2] ARCH. OF OPHTHALMOLOGY, vol. xxiv., p. 310.

Omitting the modifications which occur near the ora serrata, I find that the retina can be mapped out into five areas, each characterized by a distinct modification of the bacillary layer.

Before describing these five modifications or systems, and indicating the areas they occupy, I think it will be conducive to a clearer understanding of the bacillary layer as a whole, if I state that the more I examine microscopic sections of the retina and investigate its structure, the more I become convinced that the ultimate fibrils of the optic nerve run from the disc to the spherules in the pigment layer without interruption. One of the leading purposes of the retinal structure seems to be to support and insulate these fibrils throughout their course. The basal portion of the rods and cones are, as Borysiekiewicz has pointed out, sheaths, in the centre of which we find a nerve fibril; but, in addition to what he describes, I notice these fibrils to be sustained in the centre of the sheaths by very minute radiating fibrillæ. In the cones the nerve fibril is not only sustained by radiating fibrillæ, but is moreover surrounded by a protoplasmic substance which fills out the sheath. This renders it difficult to distinguish the nerve fibril and the fine radiating supporting fibrillæ in the cones.

Obliquity, which is practically unavoidable in transverse sections, frequently causes the nerve fibril to appear decentred. The protoplasmic substance in the cones easily coagulates during the preparation of the specimen and thus becomes opaque, and the sheaths themselves vary considerably in transparency according to the hardening reagents employed. The following figure shows the basal portion of the rods and cones as seen transversely under a high power, and shows the fine fibrillæ sustaining the nerve fibrils.

The interstices between the rods and cones are filled out with a substance which stains somewhat darker than the rest, but I have not yet been able to ascertain its nature. This, however, shows that the rods and cones in their basal portions are held together, and are not separated from each other by a free space, as generally described and figured.

Want of material has rendered it impossible for me, up to the present, to obtain transverse sections through the five different modifications or systems of the bacillary layer. I have, so far, only obtained sections through what I shall hereinafter term the first or peripheral system.

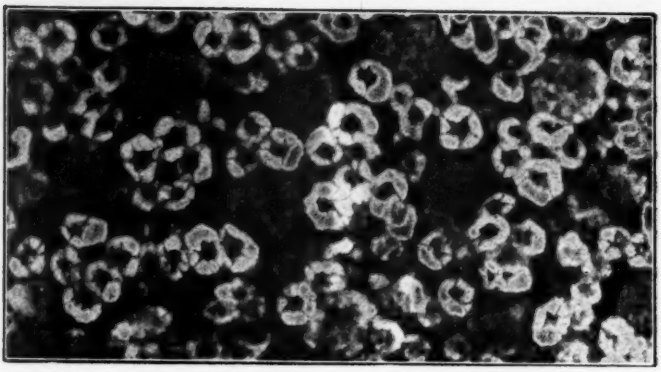

FIG. 11.

Transverse section through the basal portion of the bacilliary layer, showing the rods as clear spaces, in the centre of which the section of the fibre is shown supported by radiating fibrillæ. The cones, much fewer in number, appear as large, dark, granular patches in which the fibres and supporting fibrillæ can be ndistinctly seen, x 1000 diameters.

In transverse sections of this peripheral system the outer, or distal, portion of the rods and cones presents the appearance of very minute separate sheaths. In the centre of these sheaths we find, just as in the basal portion, a nerve fibril supported by radiating fibrillæ. The cones are slightly larger than the rods and contain the protoplasmic mass above mentioned. The following figure is a photograph of such a section.

It will be seen by comparing these two figures that the nerve fibrils, probably through diminution of their perifibrillar substance, become thinner and thinner as they approach the crystal-pigment plexus, hence it is not surprising that it should be so difficult to trace their course through the plexus to the spherules.

It is only when the sheaths are very transparent that the nerve fibril can be traced through the rods and cones in vertical sections. Swelling of the cone sheaths and coagulation of the protoplasmic mass, produced by certain reagents, frequently cause the cones to stand out like swollen flask-shaped bulbs, whilst in reality the contrast between the rods and cones is much less marked than shown in the text-books.

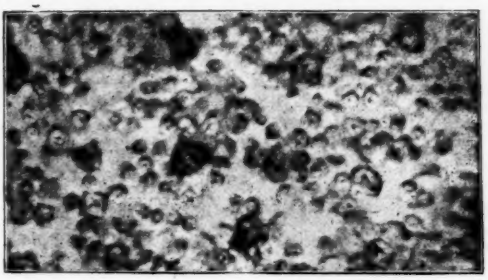

FIG. 12.

Transverse section through the distal portion of the rods and cones of the peripheral system. The cones, twelve in number, appear larger and darker than the rods. x 1000 diameters.

I have endeavored to determine the extent of each of the areas of the retina in which the five distinct systems of the bacillary layer occur, but up to the present I have only obtained reliable results in a line projected through the disc and fovea and in lines parallel to it. The limits of the systems are most clearly defined in the above-mentioned line, whilst the further we go from this line the more we find that the systems merge imperceptibly into each other. This renders it extremely difficult to determine where the one system begins and the other ends. I think that sections at right angles to those I have already obtained will be necessary in order to check my results before I can map out the whole extent of the areas with accuracy.

I will therefore, for the present, rest content with giving the following diagram of the distribution of the systems on a line projected through disc and fovea.

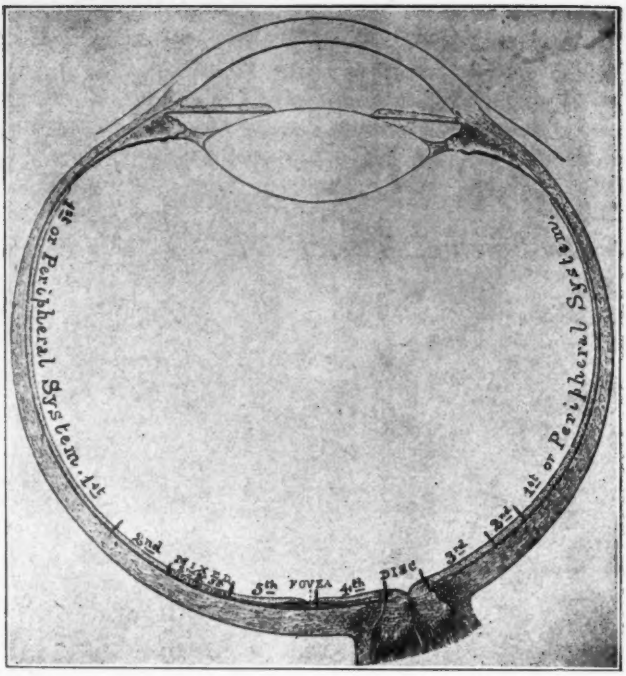

FIG. 13.

Diagram of an adult eye in a horizontal plane through the optic nerve and fovea, showing the order and relative extent of the five areas of the retina corresponding to the five systems of the bacillary layer. Drawn to scale and magnified four diameters.

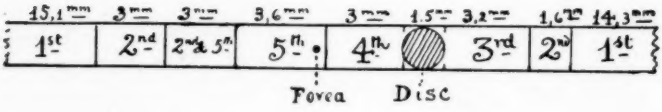

FIG. 14.

Diagram of the differentiated area showing the extent of the systems drawn to the same scale as above with the actual measurements indicated in millimetres. The first and the second system are identical in appearance on both sides.

By using the expression differentiated area I wish to draw a distinction between the large peripheral area in which the first system occurs, and the areas in which we find the layer differentiated and more highly organized.

It will be seen from the above diagram that the fovea is the centre of this differentiated area, and that the point at which the fourth and fifth systems meet is not far removed from the fovea.

In all sections through the differentiated area I find the transition from the first to the second system abrupt; the other systems merge gradually into each other everywhere except in the line represented in the diagram. In that line the limit between all the systems is clearly defined except between the second and fifth. Between these we find a considerable extent over which the bacillary layer partakes of the characteristics of both these systems, gradually losing the appearance of the one as we approach the other. I have therefore indicated this transition area in the above diagrams.

I now propose describing the five systems *seriatim*.

THE FIRST OR PERIPHERAL SYSTEM.—This system is to be found throughout the peripheral area, marked "1st" in the diagram, which is much the largest in extent and it presents the appearance shown in the following figure.

It will be seen from the following figure that the filamentary prolongations of the rods and cones are of equal length and are continuous with the crystal-pigment plexus.

The basal portion of this system somewhat resembles the description usually given. Near the ora serrata the difference between the bulbous cone-bases and the narrower bases of the rods can be distinctly seen, but the more we move away from the periphery the longer the rods and cones become, and the less apparent is the distinction between them, until ultimately they are so close together and present so little contrast that one can only distinguish between them with great difficulty.

The distinctive feature of the outer half of the bacillary layer in this system is that the distal portion of the sheaths

is unsupported, every one of them being separated from its neighbour. The rod sheaths present a fine strap-shaped appearance, whilst the cone sheaths appear slightly thicker and are marked with fine irregular transverse striations.

FIG. 15.

Vertical section through the bacillary layer of the first or peripheral system. x 1000 diameters.

When carefully focussed with a high power these fine striæ seem to proceed from the central fibril towards the sides, and are therefore no doubt the sustaining fibrillæ as seen through the transparent cone-sheaths, since they correspond both in size and direction to the sustaining fibrillæ seen in the transverse sections (*vide* Figures 11 and 12). The outer extreme end of the cone sheath, however, shows some eight or ten transverse buttonhole-shaped apertures.

THE SECOND OR INTERMEDIATE SYSTEM.—This system occurs in the area marked "2nd" in the diagram, and presents the appearance shown in the following photograph.

FIG. 16.

Vertical section through the bacillary layer of the second system. x 1000 diameters.

In the basal portion of this system the rods and cones cannot be clearly distinguished. The striking feature is to be found in the distal portion which consists of a coarse plexus which joins on to, and is continuous with the finer crystal-pigment plexus. The striated cone-sheaths can be seen running through this coarse distal plexus, but the finer distal rod sheaths can nowhere be seen. The rod sheaths themselves seem to differentiate to form this plexus, whilst the nerve fibrils leave the basal rod-sheaths supported by this coarse plexus until they reach the finer crystal-pigment plexus.

Transverse sections, which I hope to obtain, seem necessary to confirm this interpretation.

THIRD OR "INNER PAPILLARY" SYSTEM.—This system is to be found in the area marked "3rd" in the diagram, situated on the inner side of the disc. It presents the appearance shown in the following photograph.

FIG. 17.
Vertical section through the bacillary layer of the third system. x 1000 diameters.

In this system the distance from the membrana limitans externa to the crystal-pigment plexus is nearly half as great again as in the other systems. It is widest near the disc, narrowing as it approaches the second system.

The basal portion of the layer in this system is very ill-defined, but the rods and cones can be distinguished. The outer portion can be divided into two parts, the inner being more like the coarse plexus which we meet with in the second system, the outer being composed of striated sheath-prolongations, similar but coarser than those we have met with as the distal cone-sheaths in the first system.

It is these striated sheaths which join on to the crystal-pigment plexus.

FOURTH OR OUTER PAPILLARY SYSTEM.—This system occurs in the area marked "4th" in the diagram, which extends from the outer edge of the disc to near the fovea. The basal part consists of rods and cones, whilst the outer portion shows striated cone-sheaths finer than in the other systems, intermingled with a fine plexus through which nerve fibrils run as they leave the rod sheaths.

The following photograph shows this system:

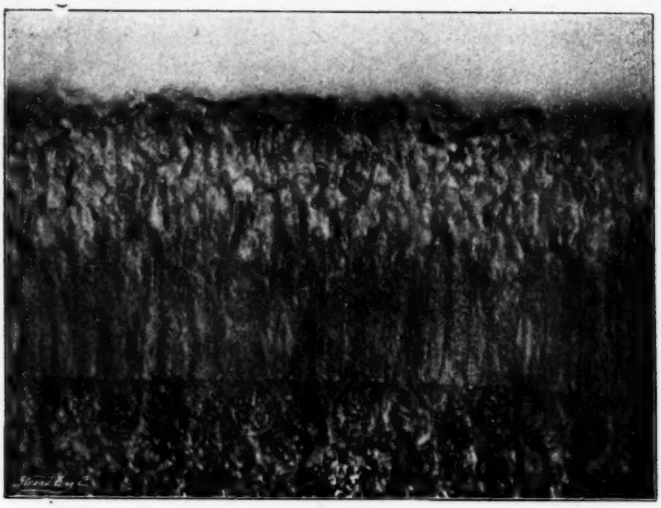

FIG. 18.

Vertical section through the bacillary layer of the fourth system. x 1000 diameters.

THE FIFTH OR MACULA SYSTEM.—This system which occurs throughout the area marked "5th" in the diagram presents the appearance shown in the following photograph.

It will be seen from this photograph that the basal portion of this layer does not differ materially from that of the other systems. This basal portion alone therefore would not warrant the statement that there are only cones at the macula.

The distal portion however shows nothing but striated sheaths so that we are no doubt in the presence of cones only. The distal sheaths of the fifth system differ considerably from those in the other systems, being of uniform thickness throughout their course, and having from the basal sheaths until they reach the crystal-pigment plexus very regular and equidistant transverse striæ, which, when greatly magnified, all appear as buttonhole-shaped apertures.

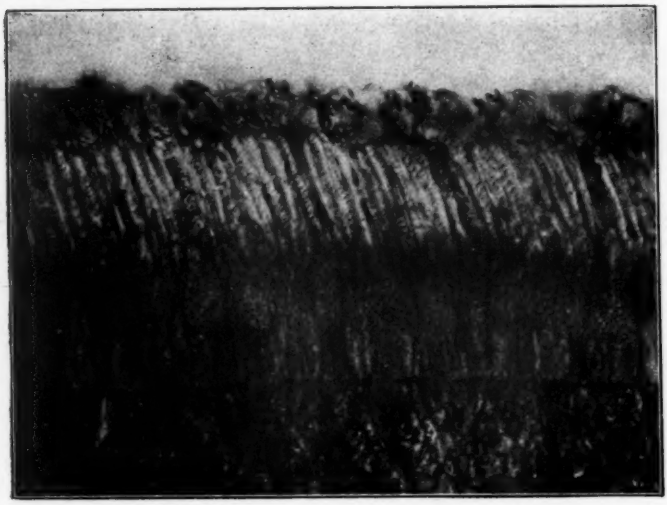

FIG. 19.

Vertical section through the bacillary layer of the fifth system. x 1000 diameters. The crystal-pigment plexus is exceedingly well shown at the end of the cone sheaths in this photograph.

In the diagram showing the areas I have, as above explained, had to mark an area between the second and fifth which partakes of the characteristics of both systems. I have thought that it might prove useful to the understanding of this paper to give an illustration of this transition form in the following photograph.

I have throughout selected specimens for photography in which the crystal-pigment plexus had been torn away

from the pigment layer, carrying some pigment crystals with it. When the crystal-pigment plexus is in situ it is so obscured by crystal-pigment that it is difficult, if not impossible, to see how the bacillary layer joins on to it; the appearance being such as to lead one to suppose that the distal portion of the rods and cones penetrates directly into the hexagonal layer.

FIG. 20.

Vertical section showing the transition from the second to the fifth system. x 1000 diameters.

To recapitulate them.—The bacillary layer—by which I understand that portion of the retina which extends from the membrana limitans externa to the crystal-pigment plexus—presents different appearances in different portions of the retina. The largest area is that comprising the entire peripheral portion of the retina, whilst surrounding the disc and the macula there is a differentiated region which can be divided into four areas each distinguished by a different form of the bacillary layer. The fovea is the centre of this differentiated region. The optic-nerve fibrils in their course from

the disc to the spherules run through the centre of the rods, and cones supported by fine fibrillæ. The rods and cones are merely sheaths for the purpose of protecting, supporting, and insulating these extremely delicate optic-nerve fibrils. In the first system the basal sheaths are continued as thinner distal sheaths which similarly support and insulate the nerve fibrils. In the rod sheaths the nerve fibrils run free whilst in the cone sheaths they are surrounded by a protoplasmic granular substance. In the second system, which borders the differentiated region, the cone sheaths are supported in their distal portion by a coarse-meshed plexus, the nerve fibrils emanating from the basal sheaths of the rods, being supported by the meshes of this plexus. A small area on the inner side of the disc shows a special differentiation of rods and cones which I have termed the third system. From the outer side of the disc until near the edge of the fovea, the fourth system occurs, which consists of fine cone-sheaths intermixed with a fine plexus in which the nerve fibrils which emanate from the rod sheaths are supported. From the fovea to the second system on the outer side, we find the fifth system which consists of cone sheaths alone, of a more definite and regular shape than the cone sheaths of the other systems. The cone sheaths of this system have transverse buttonhole-shaped apertures which under a low power appear as striæ. The nerve fibrils which run through the cones are protected by sheaths containing a protoplasmic substance. On the other hand, the fibrils which run through the rods are only entirely protected by sheaths in the first system whilst in the other systems they are partly protected by sheaths and partly supported by a plexus. In all cases the cones are of equal length with the rods and the entire bacillary layer joins on and is organically bound to the crystal-pigment plexus.

(*To be continued.*)

THE SPIDER CELLS OF THE OPTIC NERVE AND RETINA.

By Dr. RICHARD GREEFF, Berlin.

(With Plates VIII. and IX. of Vol. XXIX., German Edition.)

Translated by Ad. O. Pfingst, M.D., New York.

THANKS to the introduction of new methods of examination, we have in recent years made a decided progress in the study of the histology of the nervous system. Whereas, with our former methods, we were able simply to impregnate all of the tissues uniformly with our staining solutions, Golgi and Ehrlich have shown us methods by means of which we can demonstrate isolated cells, with their processes, in the midst of a labyrinth of other cells which remain unstained. Thus we are enabled to disentangle, as it were, interlacing cells. To do this and to follow the cell prolongations to their minutest ramifications had hitherto seemed wellnigh impossible. The most serviceable method in this respect is the one devised by Golgi, which has been as successfully modified by Ramon y Cajal. This method, employed upon the optic nerve and retina, has demonstrated that these structures contain histological elements identical with those of the central nervous system,—a fact which only serves to verify what the embryology of these parts teaches.

The optic nerve is made up of nerve fibres which represent the prolongations of nerve cells. These cells are found chiefly in the ganglion-cell layer of the retina, and their prolongations terminate, in arborescent branches, in the primary

optic centre of the brain. These prolongations are, in other words, centripetal nerve fibres. Other fibres of the optic nerve take their origin in the ganglion cells of the brain and terminate, in the same anastomosing way, in the inner plexiform layer of the retina. These fibres have been termed by Ramon y Cajal, their discoverer, the centrifugal nerve fibres of the optic nerve.

It is a well known fact that the fibres of the optic nerve are separated into bundles by connective-tissue septa originating from the pia mater investing the nerve. These septa, however, simply surround the bundles and do not penetrate into their interior, the fibres constituting the bundles being held together by the *neuroglia* (nerve-cement) substance.

It was recognized by the oldest authors that this neuroglia was composed of two elements, viz: (1) the *cement-substance proper*, a diffuse granular basis-substance, which surrounds and unites the separate cells and fibres; and (2) the star-like neuroglia cells. Golgi's mixture stains not only the nerve substance but also the neuroglia, according to the length of time that the objects have remained in the solution. When we use it upon the optic nerve we detect, between the nerve fibres and the nerve-bundles, most beautiful cells with multiple prolongations identical with those found in the central nervous system. These cells bear the name of *Deiters's cells*, Deiters having been the first who succeeded in demonstrating them. He also expressed the belief that there was no anastomosis between their prolongations, although he was unsuccessful in demonstrating this fact.

Opposed to his view were Fromman, Ranvier, and Gierke, who believed the prolongations to form a network by their anastomosis. The further development of our knowledge of the neuroglia cells is due to the researches of Boll, Kölliker, Jastrowitz, Gierke, and others. The appropriate name of "spider cells" was proposed for them by Jastrowitz. They really are much like long-legged spiders, although as Gierke says, "we never see spiders with as many legs as the cells have prolongations." Before Golgi,

it was principally Gierke who upheld the idea that these cells were not connective-tissue cells, but that they were peculiar to the nervous system and were of the same embryological origin as the nerve elements. The credit of having solved the question of their anastomoses belongs to Golgi who, by his new method of staining, has brought out most beautifully the form of the cells with their numerous prolongations. We are now able to say with certainty, at least of the central nervous system, that the cell prolongations, although intermingling and crossing each other frequently in their course, have no direct anastomoses. Golgi's researches have also extended to the embryology of the cells. He has further shown in what relation they stand to the cells of the ependyma. In acknowledgment of these important and instructive researches, Kölliker has suggested that they be called *Golgi cells.*

We find the Golgi or spider cells in vast numbers throughout the gray and the white substance of the cerebro-spinal system of nerves. They lie in close proximity to one another, their prolongations enveloping the nervous elements, cells, and fibres in a dense meshwork. Kölliker distinguished between the short and the long radiator cells according to the extent of their prolongations, although we also find intermediary varieties. The short radiator cells possess a large body and have an exceedingly large number of short ramifying processes. They are found in the gray matter of the brain and cord. They have a peculiar tendency to follow the course of the blood-vessels, to the walls of which they become adherent. The bodies of the long radiator cells are somewhat smaller, as a rule flatter, and have an elliptical shape. The prolongations are considerably longer and are more delicate. We find them principally in the white nerve substance, but they are also present in the gray substance, just as the short radiator cells are also to be found in the white matter. Reasoning especially from embryological data, we must consider the optic nerve as a direct continuation of the white substance of the brain. The fact that we have found the same neuroglia cells in every part of the optic chiasm and nerve and in the nerve-

fibre layer of the retina as those in the brain has naturally strengthened us in this belief.

The retina, too, is in all respects a part of the brain. It is, as Ramon y Cajal has pointed out, a true nerve centre which has been pushed forward to the periphery. We may, consequently, expect to find the retina containing Golgi cells in some of its layers. These we will describe later on, and will *consider the retina in the light of a portion of the gray substance of the cerebro-spinal system.*

The neuroglia cells have previously been demonstrated by different methods of staining. Leber observed in a cross-section of the optic nerve a fine network of connective tissue, which passed between the nerve fibres everywhere. He took this to be the neuroglia of the nerve. In the sagittal sections he was able to make out that the delicate network, with its transverse meshes, was connected with star-like cells, which were situated partly in the interior of the bundles, partly on the margin of the latter. Even in sections of nerves treated with Müller's fluid, especially when stained with carmin, it was evident that the bodies that they had to deal with were more than free nuclei; that they were connective-tissue cells with prolongations. The latter can readily be isolated by teasing the nerve substance. "These cells," he says, "are closely crowded between the bundles of nerve fibres, in rows, extending in the direction of the nerve, especially near the eye."

Schwalbe described in similar terms neuroglia-stars, which he demonstrated around and in the nerve bundles, by the use of acid fuchsin.

The method which Golgi had so successfully employed upon the cerebrum, cerebellum, and cord, in demonstrating the structure of the neuroglia, was first used upon the peripheric nerves by Louis M. Petrone.[1] His researches were carried on in the laboratory of Professor Bizzozero in Turin, the method used being the oldest one of Golgi, the so-called "sublimate method." The fresh specimen of a peripheric nerve was hardened for two months in Müller's solution, or a 2 per

[1] Petrone: "Sur la Structure des Nerfs Cérébro-Rachidiens," *Intern. Monatschr. f. Anat. u. Physiol.*, Bd. v., 1888, p. 39.

cent. solution of potassium bichromate. It seems that the length of time of its exposure to this fluid is of great importance for its further treatment. Hence, in order to be sure, taking some of the specimens out of the fluid at the proper stage, he took out a small piece every ten days. These pieces were then put into a 0.35–0.50 per cent. solution of corrosive sublimate, which was renewed every ten days in the beginning and every five days later on. When the objects had remained in this fluid for two months they were ready to be cut.

Later on Petrone substituted nitrate of silver for the sublimate suggested by Golgi. As above, the objects were hardened for two months in Müller's solution, and were then put into a 0.75 per cent. solution of nitrate of silver, after which they were imbedded and the sections made. I have employed these methods, in conjunction with Dr. Abelsdorf, but find them much more difficult than the fast method of Golgi, with osmic acid and potassium bichromate, which has been developed principally by Ramon y Cajal. In the former methods it is of importance that the objects do not remain for too long or too short a time in the chromic solution, the time that they remain in the sublimate or silver solution being less important. Petrone pointed out the fact that all of the elements are seldom stained equally well, either the one or the other being stained alone, as a rule. The silver method is the preferable of the two.

It was with these methods that Petrone, among other cranial nerves, also examined the optic nerve and commissure and found the familiar neuroglia cells much clearer than they had previously been seen. In the plate accompanying his publication we find the neuroglia cells of the optic nerve represented. To my knowledge these are the only cuts representing the cells stained by the new methods. I do not consider in these remarks Weigert's new neuroglia-staining method, which is based upon entirely different principles, and the full details of which have not yet been published.

The easier and more complete method for staining the neuroglia cells is the fast Golgi method of Ramon y Cajal, which I have been using for some time.

We are already in possession of a small amount of literature on this subject. Kallius[1] spoke of the method at the meeting of the Göttinger Physico-Medical Society. Shortly afterwards Michel[2] demonstrated, to the Würtzburg Physico-Medical Society specimens stained by this method. Ramon y Cajal,[3] in his publication about the retina, mentions having found the same neuroglia cells between the fibres of the optic nerve that he found in the layer of the ganglion cells and the layer of the nerve fibres of the retina. Later, I found also a short publication on the subject, in the Italian language, by De Bono.[4] Notwithstanding this, I am inclined to believe that it would be of interest to ophthalmologists to give a more minute description, with illustrations, of these delicate cells. My researches, moreover, which I have been carrying on for some time, have been made upon different species of animals, in which I have found interesting variations, which are worth describing.

Although the spider cells of the optic nerve do not differ materially from those of the brain, which of late have received the attention of some of our most able anatomists, the demonstration of this fact alone is of interest. It also remains for us to study the distribution of the cells in the optic nerve and retina, their relative number, and their situation as regards the nerve fibres and bundles.

I may assume that we are all more or less acquainted with the fast method of Golgi. In my preface to Ramon y Cajal's *Retina*, I entered more fully into the details, and quoted the literature on the subject.

METHOD OF EXAMINATION.

Small pieces of the nerve taken from the body soon after death, are put into a solution of osmic acid 1 % 1 part, potassium bichromate 3½ % or 1-2 % solution of sodium or ammonium bichromate, 4 parts, where they are allowed to

[1] Kallius: *Göttinger Nachrichten*, 1892, No. 14.
[2] Michel: *Sitzungsberichte der Würzburger med.-naturw. Gesellschaft.*
[3] Ramon y Cajal: "Die Retina der Wirbelthiere. Uebersetzt unter Mitwirkung des Verfassers von R. Greeff." Wiesbaden, 1894, J. F. Bergmann.
[4] De Bono: "Sulla Neuroglia del Nervo Ottico e del Chiasma in alcuni Vertebrati." Preliminary Communication, *Arch. di Ottalm.*, vi., 5.

remain 12 to 48 hours. After drying them with filter paper, they are put into a 0.75 % solution of nitrate of silver, for 12 hours or more. It requires considerable experience with the method to learn just how long to keep the objects in the first solution, to get them impregnated to the best advantage. From the silver solution the pieces are put, after rinsing in water, into absolute alcohol for ½ hour, thence into thin celloidin for 5 minutes, and fastened upon a cork, when after a short time they are ready to be made into sections. If the first few sections contain no stained cells, we bring the objects back into the first solution and repeat the entire procedure.

Although the cells are easier to stain in the optic nerve than in the retina, the process with them also requires considerable experience and patience, which may have a tendency to discourage the novice.

The neuroglia cells which we find in the optic nerve are identical with those found in the brain. They take on a deep brown or black stain, while the surrounding tissue is of a delicate yellow. Cell body and cell prolongations are impregnated equally well, so that we are not able to detect a nucleus or the minute structure of the protoplasm. The picture they present under the microscope may be compared to a silhouette. The shape of the cells varies in different parts of the body and particularly in different species of animals.

In man there is a great similarity between those cells found in the interior of the optic nerve and the long spider cells found in the white matter of the brain. (Fig. 1.) The bodies of the former seem slightly smaller and their longitudinal processes longer. The body is star-shaped and is about 0.02 – 0.03 *mm* in size. In longitudinal sections we see that the cell body is flattened slightly laterally and that they are elliptical, the long diameter being in line with the course of the nerves. Owing to the uniform black imparted to the cell body by this method, the carmin or hæmatoxylin stains are more appropriate for studying the details of this structure. The cell prolongations are, on the other hand, brought out decidedly better with the Golgi method.

As we make our sections rather thick, up to 0.1 *mm*, we are enabled to see most of the cell's prolongations in the same section. Those taking their course directly backwards or forwards would naturally be severed from the body in making the section. According to Kölliker, the glia cells of the brain have from 10 to 20 prolongations. Gierke places their maximum number at 25. In the optic nerve I have not infrequently seen them exceeding this number. The prolongations, which originate at the body by a broad, slightly flattened base, soon become round, and keeping a uniform size, without any nodular enlargements, extend great distances. Those emanating from the same body are, as a rule, of the same size. Although the processes are frequently seen to cross each other, there is nowhere a distinct communication between them. They all terminate in a blind extremity.

As apart from these cells no network of any kind can be detected in the optic nerve we must assume, that the neuroglia is made up entirely of the cells and their prolongations, and that these do not form a real network. The prolongations take a straight or slightly curved course, some being a little tortuous. It is exceptional that we find them as tortuous as they are in the brain. Whereas most of the prolongations pass under the form of a single thread to their termination, we also find some of them bifurcating shortly after they leave the cell body. They terminate abruptly without tapering to a point, in fact they not infrequently present a slight varicosity at their end. The course of the prolongations is transverse oblique, or longitudinal to the direction of the nerve fibres, those running longitudinally being most numerous. They also have the peculiarity that the more nearly they approximate a longitudinal course, the more they increase in length, those running directly parallel to the nerve fibres being by far the longest. In consequence of this not only the cell body but also the cell as a whole has an elliptical form. From this it is evident that the cells in a sagittal section appear to have more prolongations than those in a transverse section. Although the Golgi method is the prettiest for bringing out the prolongations, we have

seen that the cell body is stained to better advantage by other methods. Leber, who was the first to sketch the neuroglia cells of the optic nerve, isolated them by teasing the nerve. Also another beautiful picture of the isolated cells, is stained by a method of Petrone's, which I also have employed successfully. Very thick sections are made of a nerve, which has been thoroughly hardened in Müller's fluid and subsequently in alcohol. They are left in a solution of picro-carmin, ammonia-carmin, or methyl-blue for several days, and then they are carefully teased in glycerin or ⅓ alcohol (Ranvier). In this way we isolate the oval, slightly flattened body with its large granular nucleus. We see several short processes radiating from the body. (Fig. 3.)

Reasoning from the results obtained by a new method which stain only the neuroglia, Weigert has come to a conclusion which had previously been expressed by Ranvier. His idea is that the prolongations are in no way connected with the cell body, the nuclei being thus independent of the fibres and simply interposed between them. That is, according to Weigert, the cell body and the prolongations, which, he says, differ in chemical composition, simply lie in close contact, but form no union. Owing to the uniform impregnation of all parts of the cell which it gives, the Golgi method is valueless for verifying the correctness of this statement. Professor Weigert kindly presented me with a section stained by his new method, but I am unable from a single specimen to venture an opinion on this subject. The method is not completely developed as yet, and has consequently not been published. We would certainly greet its introduction with pleasure, for it is only by a combination of different methods that we arrive at conclusions.

In the optic nerve the spider cells are most abundantly situated between the nerve fibres, although some are found between the bundles of fibres. Their prolongations are not confined within the limits of a single bundle of nerve fibres, but frequently pass from one to another. I have often observed prolongations that passed through several bundles.

It is hard with the Golgi method, owing to the irregularity of its action, to form an estimate of the *number* of

cells contained in a nerve. In close proximity to beautifully stained cells are numbers which remained unstained. We can get a better idea of their number by using the old methods—picro-carmin or hæmatoxylin—by which we see that the neuroglia cells are closely crowded in the optic nerve, as they are in the white substance of the brain.

In using the Golgi method we get the impression that the neuroglia cells are more abundant near the surface. This is due only to the fact that the specimen is more thoroughly saturated with the bichromate solution near the surface, in consequence of which more cells take the stain. By keeping the specimens in the solution longer we can produce a different result, the superficial cells being poorly stained, while the deeper ones have taken the stain well.

As another peculiarity of the spider cells, I may mention that I have never found them situated on the surface of the nerve, though we find them abundantly near the surface. They send numerous branches to the surface, where they terminate in a slight varicosity. The terminations are rather hard to distinguish, on account of the precipitate of chromate of silver on the surface. We are able to combat this disadvantage to some extent by surrounding the specimen with a thin coat of celloidin before exposing it to the silver. The celloidin catches up the precipitate.

The processes also have a tendency to adhere to the small vessels of the nerve, where they form a varicosity like that at their end (Fig. 1, *d*). The cell body never lies in direct contact with the vessels.

I have found the long radiator cells in several of the mammalia (man, ox, rabbit), in the optic tract, chiasm, and optic nerve, down to the papilla. There is a slight change in the shape of the cell in different parts of the nerve. In the chiasm, for instance, they lie close together, the body is small and round, and their prolongations reach at times an enormous length. This is particularly the case in those prolongations that pass through the nerve fibres directly to the surface. In the optic nerve the cells and their processes are more elliptical, the long diameter extending in the direction of the nerve. As we approach the papilla, the cells be-

come more crowded, they are smaller, and their processes shorter. In the papilla the spider cells become more like those described by Ramon y Cajal, in his examination of the retina; they are much smaller, irregular in shape, the prolongations being more numerous, shorter, and crowded together. The most of them pass forward to the surface of the papilla. Those cells on the surface gradually pass over into the spider-cell form, as we find them in the retina, between the nerve fibres, in the nerve-fibre layer.

Schwalbe, Borysiekiwitz, and others have observed, in sections of the retina stained with hæmatoxylin or carmin, round or oval nuclei, surrounded by a granular protoplasm, between the fibres of the nerve-fibre layer, which they called neuroglia cells. Ramon y Cajal was able to corroborate their opinions later on, by the employment of the Golgi method. The cells were true spider cells, and have since then also been seen by Kallius. I will not enter into a discussion as to which cells we are to consider nerve cells and which neuroglia cells. There is a difference of opinion on this subject, especially between Ramon y Cajal and Dogiel. It is certainly impossible to draw a conclusion, as to the function of the cell, by its shape, and, owing to their great variety, it is sometimes difficult to distinguish analogous cells. We are certain, however, that the retina contains true neuroglia cells. The spider cells are with some slight differences in detail identical with the spider cells found in the cerebro-spinal system, and so long as the latter are regarded as neuroglia cells, the former must be so regarded too, as the spider cells are also to be found in the ganglion-cell layer of the retina between the ganglion cells, with which they must not be confounded. (Fig. 4.)

In the retina we find the spider cells in the nerve-fibre layer and the ganglion layer, the processes, in the latter case, often extending into the inner molecular layer. I have little to add to what has been said of these cells by Cajal and Kallius. They lie in close opposition, especially near the papilla of the optic nerve. They vary considerably in shape, some being star-shaped, others round, oval, or triangular. Their shape changes to some extent with their

location, those found near the membrana limitans being, as a rule, flat or triangular with the broad side directed toward the membrane. Their prolongations are short, very delicate, and present in large numbers. They are sometimes arranged in bundles, in which case a bundle emanates from a single pedicle. The prolongations have not, like those in the optic nerve, a tendency to disperse in all directions, but have a tendency to pass to the interior—that is, the ones emanating in layer of the nerve fibres pass into the layer of ganglion cells, and those originating in this layer pass to the inner molecular layer. A good many of the processes also leave this course to follow the nerve fibres.

Cajal, Golgi, and Manfredi have observed that, below the bundle of nerve filaments, the protoplasm of the cells is arranged in lamellæ with concave contours.

The spider cells show a still greater variety in shape, in the different classes of vertebrate animals. There is even a difference in the different mammalia. The most regularly stellate shape and the most delicate processes are found in man. The processes seldom bifurcate, but retain a uniformly cylindrical shape to their ends. They are not very abundant, but reach a great length. In the lower classes of the mammalia the cell body is thicker, and more irregular, the processes being also thicker and shorter. This, combined with the fact that the cells are less abundant, accounts for the labyrinth, formed by the interlacing filaments, not being as delicate and complicated.

In other classes of vertebrates the optic nerve contains neuroglia cells of an entirely different form. In Fig. 2 I have represented those of the sparrow. The round, triangular or multangular body is thicker than the delicate cells found in mammals. The body has a great number of short, thick prolongations. They taper slightly to their extremity, where they terminate in a varicosity. The prolongations, unlike the uniform ones found in mammals, frequently have varicosities in their course. They have also the peculiarity of becoming bunched at times, so that quite a number of them emanate from one pedicle. They have some resemblance to the short radiator cells of Kölliker, which are principally

found in the gray substance of the cerebro-spinal system of man. The processes are much more numerous than in mammals, but, owing to their deficiency in length and the greater distance between the cells, we do not find the same delicate and intricate plexus in birds as is formed by the processes of the spider cells of mammals.

Fish have again another type. The cells become more and more irregular, coarser, and thicker, the processes becoming shorter, thicker, and more nodular. The latter have almost the shape of a triangle with its base toward the cell body. At their apex they usually have a small terminal bulb or varicosity.

We see that, as we descend in the animal scale, the cell body becomes misshapen and the prolongations shorter and thicker and that the nerve fibres become less thoroughly interwoven. This fact is not unimportant, if we adopt the new idea regarding the physiological function of the neuroglia tissue.

Of late the neuroglia tissue is looked upon not only in the light of a supporting substance, but as also having the **function of isolating the nerve fibres.** The prolongations of the neuroglia cells, interlacing, as they do, between the nerve fibres and cells, prevent them from coming in direct contact, and may be compared to the insulating silk about electric wires.

By virtue of this insulating substance in the retina, the ganglion cells are enabled to transmit impressions of light, received from the rods and cones through the nerve fibres of the optic nerve, to the centres in the brain.

We know, from earlier investigations, that the optic nerve of man contains the most delicate nerve fibres, and that they become coarser as we descend in the animal scale. The same holds true of the neuroglia cells and processes. The more delicate the nerve fibres, the finer the neuroglia. Both factors are no doubt of importance with regard to the keenness of sight, for the acuteness of vision is dependent upon the ability to receive the impressions of isolated points.

I have also made endeavors to employ the Golgi method

upon pathological tissue. In an optic nerve with neuritis and beginning atrophy, the processes of the neuroglia cells seemed to be thicker and more tortuous in parts. I do not, however, want to assert this with certainty, from the examination of a single case. The Golgi method is not at all well adapted for the examination of pathological specimens. At any rate, negative results prove nothing, for we have seen that it is dependent upon chance, whether or not certain parts stain, and that all of the cells contained in a section are never equally well stained. It would be of interest to study the changes, if any, in the neuroglia in nervous tissue that has become atrophic. With Weigert's method we can see that in places where the nerve tissue has become necrotic a dense labyrinth of neuroglia takes its place. With Golgi's method it is impossible to stain our specimens so as to show the absolute relations of all the cells contained to each other. And here I may repeat what I have said above, that it is of decided value to employ on an organ several staining methods, based upon different principles. The Golgi method has furnished the means of staining, in the midst of similar cells, a single cell, with its prolongations, more beautifully than was previously possible. Their number and the manner of their distribution must be studied by other methods, so that we may, by their combined application, get the best possible idea of the structure under consideration.

Explanation of the Figures.

FIG. 1.—Spider cells in the optic nerve of man, stained by Golgi's rapid method. Sagittal section. (Sketched with Zeiss Ocular 1, System 7.)

a, Precipitate of chromate of silver on the surface.

b, Spider cell.

c, Line of separation of bundles of nerve fibres.

d, Blood-vessel.

e, Nerve fibres of optic nerve.

The cells, as drawn, are not quite as numerous as they were in the specimen.

FIG. 2.—Spider cells in optic nerve of sparrow (double staining of Cajal).

FIG. 3.—Cells of optic nerve in man, stained with picro-carmin and isolated by teasing.

FIG. 4.—Neuroglia cells in retina of an ox.

a, Inner molecular layer.

b, Layer of ganglion cells.

c, Layer of nerve fibres.

FIG. 5.—Section through the optic chiasm of a pigeon with numerous spider cells.

a, Gudden's commissure.

b, Optic tract.

c, Chiasm.

d, Precipitates.

e, Thalamus opticus with prolongations of nerve cells.

THREE CASES OF CONGENITAL COLOBOMA OF THE LENS.

By Dr. THEODOR CHRISTEN,

ASSISTANT TO THE UNIVERSITY EYE CLINIC OF PROF. SCHIESS-GEMUSEUS, IN BASEL, SWITZERLAND.

Translated by Dr. A. B. KIBBE, Seattle, Washington.

(*With Plate III. of Vol. XXIX., Germ. Ed.*)

FROM a collection of all reported cases in literature made by Dr. E. Bock (*Die angeborenen Colobome des Augapfels*, Wien, 1893), it appears that congenital malformations of the lens belong to the rarest of ocular findings. In addition to six of his own the author could find reports of but forty-six other cases occurring in thirty-eight persons. It has therefore appeared to me justifiable to publish the following five cases in three patients which I have seen within a year in the policlinic.

CASE I.

H. R., æt. nineteen, laborer. Vision defective from youth. Strabismus divergens of right eye amounting to thirty degrees when measured by perimeter. Movements normal. Left eye of normal size and shape.

Right eye (Fig. 1).

Anterior chamber deeper than normal. Iris markedly tremulous, tissue slightly atrophic, pupil round, reaction prompt. V, with normal pupillary diameter, $\frac{8}{20}$; with 9 D, V $\frac{18}{20}$. Cannot read when pupil is contracted. Pupil dilates moderately under atropia and cocaine. Oblique illumination shows a large num-

ber of very fine pupillary membranes. The transparent lens seems to be displaced upward and inward, thus rendering the lower outer edge plainly visible. By aid of the mirror three small indentations are seen in close proximity to one another, separated by two pointed elevations. From the tip of each elevation one or more delicate threads extend, evidently the remains of the zonula. Here we find a portion of the lens wanting, with complete transparency of the remainder. With wide pupil patient reads Jaeger 2 at 12 *cm* with + 15 D.

Left eye (Fig. 2). Upward and outward a congenital coloboma of iris exists of the usual character. With normal diameter of pupil, V $\frac{5}{5}$. No improvement with glasses. Patient reads Jaeger 4 with 4.75 at 12 *cm*. The upper portion of the periphery of lens is visible in the coloboma. Its edge bears a slight indentation not extending across the entire width of the coloboma. Here the zonula is totally wanting. No opacity of lens visible.

Case II.

Maria S., æt. eighteen, servant.

Right eye: Small congenital inferior coloboma of iris. Slight evidence of pupillary membrane. Lens clear. Periphery of same visible in coloboma with ophthalmoscope. It presents a jagged edge slightly concave, from which the lens capsule slightly wrinkled spreads out, terminating in a convex arc which gives origin to a number of delicate zonula fibres. Ophthalmoscopic examination shows extensive coloboma of choroid, extending to and including the papilla. V = $\frac{1}{10}$, M 1.25.

Left eye: Small congenital coloboma downward. The coloboma of the lens, which is visible in the periphery of the iris coloboma, presents the same character as does that in the right eye. The choroidal coloboma also is similar. V = $\frac{1}{10}$, M 1.25.

Case III.

Ehrard K., æt. twenty, laborer. Vision had always been bad. For a time was an inmate of a blind asylum. Right eye was removed in 1892 for an inflammatory affection.

Left eye: Inferior congenital coloboma of iris. Lens clear. On dilating pupil with atropia a defect in the lens was revealed. The capsule, however, was of normal dimension. Coloboma of choroid. V = $\frac{5}{200}$. Good projection. Refraction myopic 10 D.

A comparative study of these cases gives the following results: Malformation of the lens occurred twice on both sides. In one case the question of its occurrence on both sides or only on one could not be decided owing to pathological changes (Case III.). The coloboma was downward four times, upward and outward once. The zonula was intact twice, partly present once, and entirely wanting twice. Particular notice is due the condition of the capsule in two cases in which it extended beyond the edge of the coloboma of the lens, retaining its normal area though the proper lens substance was absent. A similar condition has not been previously described by other authors. This is of interest biologically as indicating a certain independence of development of the lens from that of the capsule.

Concerning the combination with other malformations we have coloboma of the iris four times (one upward and outward and three downward); in three of the number, those directed downward, coloboma of the choroid was also present. Remains of the pupillary membrane were found in three eyes: once very extensive, without other malformation; twice barely perceptible, with iris and choroidal coloboma. The iris was tremulous in two cases.

SYPHILITIC AUTO-INFECTION, AND THE HARD CHANCRE OF THE EYELID.

By S. HOLTH, Drammen, Norway.

Abridged translation by S. Lustgarten, M.D., New York.

ARTIFICIAL auto-inoculation with the hard chancre always yields negative results when done late. The same result is usually obtained when done early. In connection with the latter event, it is most remarkable to note that so many eminent syphilographers are wholly unacquainted with recent cases of auto-infection, in which a hard, indurated chancre appeared on the site of the inoculation, after the lapse of an incubation period of two or more weeks.[1]

Their unfamiliarity with this subject is further strengthened by the conspicuous absence of such observations in their writings. The possibility of a hard chancre implanting itself through auto-inoculation on the eyelid or conjunctiva is not even mentioned by our two largest text-books on ophthalmology.[2]

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[1] See for instance

Louis Jullien : *Traité Pratique de Maladies Vénériennes*, 2d ed., Paris, 1886, p. 347 : " Le chancre simple est re-inoculable au porteur ; le chancre infectant ne l'est jamais."

Charles Mauriac : *Syphilis Primitive et Syphilis Secondaire*, Paris, 1890. That Mauriac was unfamiliar with the subject in question is evidenced from his observations on pages 314 to 317. He says : " If, in one and the same individual, several hard chancres appear, their recurrence and development took place at the same time ; the interval between the appearance of chancres was never noticed to be longer than seven days. The belief in auto-infection has reference to pseudo-chancres, which ought never to be confounded with the primary lesion." On page 285, the same author states : " Re-inoculation may occur before the chancres break out, but never after. This immunity continues through life."

Gruenfeld in Eulenburg's *Realencyclopedie der gesammten Heilkunde*, II. Aufl., Bd. xix., S. 324.

[2] Graefe-Saemisch : *Handbuch*, Bd. iv., 1876, p. 417 ; de Wecker et Landolt : *Traité Complet d'Ophtalmologie*, t. i., 1880, p. 10.

In a monograph on hard chancre of the eyelid, by David de Beck, 1886, the possibility of such an event is denied.[1]

I have not on hand the monograph by Claude Savy,[2] but if mention had been made there of auto-inoculation, Jullien, who quotes him, would undoubtedly refer to it.

Inasmuch as a knowledge of the fact that auto-inoculation with the hard chancre can produce positive results is generally lacking among syphilographers and ophthalmologists, may I be permitted to report briefly the numerous already recorded cases, and add two new ones, before I touch upon my observations regarding the production of hard chancre upon the eyelid by means of auto-inoculation.

The first who spoke of positive results of auto-inoculation were the two eminent Norwegian syphilographers, J. L. Bidenkap,[3] 1863 to 1865, and W. Boeck.[4] These two authors were unionists, and to a great extent set forth the doctrine of "Syphilisation."

Namely: Auto-inoculation with the soft chancre as a means to cure syphilis, according to the principles laid down by Auzias-Turenne. When a hard chancre is employed for purposes of auto-inoculation, the result, to be sure, usually remains negative. But in a few—from seven to eight cases—Bidenkap observed, that when the inoculation took place early—say, within six weeks after the appearance of the initial lesion—within two weeks hard papules appeared on the site of inoculation, and long before any sign of secondary manifestations showed; these papules presented the characteristics of an initial lesion, while some were typical chancres. Similar cases were reported later by W. Boeck.

These observations of Bidenkap and Boeck were at length

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[1] *Contributions from the Ophthalmic Clinic, Medical College of Ohio*, No. 3, July, 1886, David de Beck: "Hard Chancre of the Eyelids and Conjunctiva." *Inaugural Address*, Cincinnati, 1886, p. 10; "Auto-inoculation having no place under the present views and contagion from a second part being necessary."

[2] "Contribution à l'Étude des Eruptions de la Conjonctive," *Thèse de Paris*, 1876.

[3] *Norsk Magazin for Laegevidenskaben*, Christiania, 1863, 1864.

[4] W. Boeck: *Erfaringer om Syphilis*, Christiania, 1875, S. 80–83 [*Deutsche Uebersetzung*, "Erfahrungen über Syphilis," Stuttgart (?), 1875].

referred to by Baumler[1] in his *Manual on Syphilis*, the only work, as far as I know, which contains a correct representation of the subject of auto-inoculation by the hard chancre.[2] E. Lang[3] also cites Bidenkap's views. Much later reports of confirmatory results of experimental auto-inoculation were published by H. Lee,[4] C. Rigger,[5] and E. Pontoppidan.[6]

Accidental auto-inoculation in patients who receive no instrumental treatment is still more rare. We are indebted for the report of the first case of the kind to Prof. C. Boeck,[7] of Christiania. In that case, there were chancres on both tonsils; some time later, long before secondary symptoms appeared, an ulcer occurred which at first healed after the application of nitrate of silver, but which, however, broke out again simultaneously with the appearance of secondary phenomena, and had the characteristics of a typical chancre. In 1889, a case was reported from Lang's Clinic, Vienna, by Dr. K. Ullmann.[8] In this instance, the infection took place on the prepuce from the frenulum. In 1891 a case was observed by Dr. Jadassohn, in Neisser's Clinic (Breslau), and reported by Dr. Otto Lasch.[9] This was the case of a stone-cutter, who had inoculated two acne pustules on the chin from a hard chancre of the upper lip. To these I add three hitherto unreported cases, one where the infection was carried from the penis to the axilla. This case occurred in the practice of Prof. C. Boeck, who kindly permitted me to report. The other two, came under my own observation; in the first, the infection was transmitted from the sulcus coronarius to the preputium; and in the second, from the penis to the eyelid.

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[1] V. Ziemssen's *Handbuch der speciellen Pathologie und Therapie*, Bd. iii., 3, Aufl. 1886.

[2] The same may be said of the little handbook of E. Pontoppidan, *Hudsygdommene og de veneriske Sygdomme*, Kjobenhavn, 1885, Aufl. 1890.

[3] *Vorlesungen über Pathologie und Therapie*, Wiesbaden, 1884, bis 1885, S. 38.

[4] *Lancet*, July 24, 1875, S. 122.

[5] *Vierteljahrsschrift für Dermatologie und Syphilis*, Bd. xiii.

[6] *Ibid.*, Bd. xv., 1883; *Annales de Dermatologie et de Syphilis*, 1885, S. 193.

[7] *Tidsskrift for praktisk Medicin*, Christiania, 1885, S. 325 und 334.

[8] *Wiener klinische Wochenschrift*, 1889, No. 21, und *Archiv für Dermatologie und Syphilis*, 1889.

[9] *Arch. f. Dermatol. u. Syph.*, 1891, p. 61.

CASE 1. (C. Boeck).—P. G. Baker, twenty-six years old, admitted to the hospital May 22, 1889, discharged June 26th. On admission a large hard chancre was found in his sulcus coronarius; indurated glands in the inguinal region; swollen glands in the neck; fading roseola. On the right side of the mammary gland, in the anterior axillary line, there was a hard lump about 2 *cm* long, 1½ *cm* wide, covered by yellowish crust and surrounded by a reddish-brown, hard, infiltrated edge. The patient admitted that the infection occurred in the beginning of February, and that at the end of the month the ulcer appeared on the sulcus coronarius, and the induration in the axilla began to form just three weeks subsequent to the formation of the swelling on the penis. At the commencement he scratched himself considerably with his finger nails. During his stay in the hospital, all his symptoms disappeared under iodide of potash.

CASE 2.—A. T. N., farmer, twenty-five years old, came to me December 20, 1893, for glasses (hypermetropic and esophoric). At the same time he requested me to treat a lesion on his genitals. On December 7th, while in Christiania, he had intercourse; excepting this he had absolutely abstained from coition during the months of November and December. On the 18th of December patient noticed a small ulcer in the sulcus coronarius. On the 20th I observed on the same site two ulcers, the size of hempseed, with somewhat infiltrated floors. Patient obtained iodol for daily application. On January 3d the ulcers were larger, oval in shape, with distinctly indurated base; the inguinal glands were hard, swollen, and indolent. The treatment was now changed from iodol to iodoform. On January 27th, the indurated ulcer in the sulcus coronarius became appreciably smaller in size, but its hardness remained undiminished. Just below the two old ulcers, long before the roseola appeared, a new round ulcer, the size of a linseed formed between the lamina externa and interna præputii. On February 13th, the induration still existing in the ulcers, a weak roseola appeared on the breast and the abdomen.

Before I touch upon the third case, I must apologize if its history should prove to be unnecessarily minute. I believe that in a history of this kind every small detail should be taken into account, for the reason that so many objections were raised against the very possibility of autoinoculation with the hard chancre, and a further reason is, to satisfy my critics who may charge me with omission.

CASE 3—On the 21st of December, Carl O., aged twenty, sailor, came to me for treatment of his eyes. About a month ago a piece of rusty iron struck his eye. As soon as the patient removed the bandage, consisting of a handkerchief and a damp linen cloth, I noticed in his upper eyelid a characteristic picture of a hard chancre, and without the slightest hesitation I diagnosed the lesion a syphilitic initial sclerosis. On palpation a hard chancre was found to exist with all its signs, but further examination, together with the peculiar history of the case, compelled me to drop the term "initial" as being inapplicable to this lesion.

Status præsens.—The middle third of right upper eyelid, under the eyelashes, was covered with a bean-shaped, bean-sized, sharply outlined, shallow, red, smooth, and, as it were, varnished-like excoriation, which extended over the pars intermarginalis, a few *mm* over the conjunctiva tarsi. The affected part of the eyelid throughout its whole thickness is so low and stiff that the tarsus cannot be bent, except by hard pressure on both sides. Besides, the whole eyelid is swollen, œdematous, and covers the upper edge of the normal lower eyelid.[1]

There is a total absence of the eyelashes[2] on the excoriated parts. No swelling of the pre-auricular glands, which we would expect, according to de Wecker, if the eyelid were infected with primary lesion. On stripping the man, I found the following: a large pinkish, maculo-papular eruption extending over the body, upper arms, nates, and thighs; a few swollen glands, the size of a barley-corn on each side of the neck and elbow-joints; the glands in the inguinal region were hard, and presented the size of hazel-nuts. On examining the penis, I found in the lamina interna præputii, about a *cm* to the right and below the insertion of the frenulum, an area the size of a hemp-seed, reddish-brown, covered with skin, with a base as hard as that of the lesion of the eyelid. Nothing was found in the mouth, throat, and anus. The examination disclosed a very imperfect history, as I could hardly ascertain a definite period of time; so I was obliged to consult the steamship record, and compare it with the patient's statements. The patient could remember the towns he visited, and could also recollect the different phases of the disease as they showed in each place; now, inasmuch as the steamer made short

[1] The size and location of the chancre, as well as the odematous eyelid, corresponded precisely with the illustration given by Jullien, l. c., p. 85. Still, in Jullien's case the chancre was "papule élevée vegetante."

[2] Jullien, *l. c.*, p. 586.

routes, the patient's statements as regards the time and place are of considerable value.

Historia morbi.—Coitus in Bergen between the 20th and 26th of August. Will not admit coitus either earlier or later in August. Between the 29th of August and the 2d of September he noticed an ulcer on the præputium on the site of the present lesion. On the 6th of September he bought iodoform in Rostock, with which he daily powdered the ulcer until about the 20th of October. Between the 6th and 15th of September he also cauterized this ulcer with nitrate of silver. Toward the 20th of October, our patient stopped applying iodoform, but for a month longer he still continued to daily examine his præputium, so as to ascertain the condition of the ulcer. He knows positively that for a long time it was not covered with skin, but it rather looked clean and healthy, so that he did not think it necessary to powder the wound any longer. On the 26th of October he had another intercourse in Rostock. Our patient insists that from the middle of November the old ulcer began to feel hard; before this, however, the ulcer was not hard, except perhaps after he applied the caustic. He still kept up examining the ulcer until the close of November. It was then covered with skin. While the ship lay in London he was engaged in cleaning a rusty piece of iron. Suddenly something flew into his right eye. He immediately felt a foreign body in his eye, and constantly rubbed it until the fireman, Robert N., turned up the upper eyelid and removed a small piece of rust. This occurred on the 20th of November. The eye improved, but on the 2d of December he consulted a physician in Sunderland, who prescribed a boracic acid solution. As yet no ulcer had formed, but a few days later the first traces of one became visible, together with an appearance of the swelling of the eyelid. On the 14th of December he consulted a physician at Randers, who ordered the same eye-wash and a two-per-cent. ointment of yellow oxide of mercury for the ulcer. On Sunday, the 18th of December, the patient, on changing his underwear, noticed an eruption on the upper arm; does not believe that at that date there was an eruption on the breast, which he saw on the 19th of December. On the 21st of December I saw him, and admitted him to the City Hospital at Drammen, where inunctions were instituted.

In the Hospital Journal the following is recorded:

Dec. 29, 1892.—Swelling on the eyelid decreased; ulcer begins to heal.

Jan. 1, 1893.—Ulcer very small, eruption disappearing.

Jan. 4th.—Ulcer on the eyelid healed; an infiltration still existing, though much less than before.

Jan. 26th.—The edge of the eyelid is still somewhat swollen and red, but the induration is unrecognizable.

Feb. 2d.—Edge of the eyelid somewhat red and hard.

On the 8th of February the patient was discharged from the hospital and saw me on the same day. The eruption had entirely disappeared; the swelling in the inguinal glands much smaller, but remained unaltered at the elbow-joint and neck; the sclerotic area in the prepuce disappeared; its place, however, was still to be recognized on the mucous membrane as a small flat depression. No hardness on the eyelid, although it was still somewhat red and swollen on the place of the chancre. (On the middle of this part, right under the ciliary edge, there was an oval flat depression in the skin, hardly the size of a barley-corn.) All the eyelashes except two very small ones, are missing from an area of 10 *mm.* Mild ptosis existing (N.B. no œdema).

The origin of the hard chancre on the eyelid in this related case is only satisfactorily explained by taking it for granted that it orginated through auto-inoculation of the hard chancre which existed on the præputium of the patient. If other explanations are attempted, one must strain the history of the disease and the clinical facts.

In all positively authenticated cases, auto-inoculation was accomplished at a very early stage in the first week of the existence of the chancre, and never later than six weeks after the infection.

If we now turn these observations to a careful analysis of the history of my patient, we must come to the conclusion that the ulcers, which the patient contracted during coitus between the 20th and 26th of August, could not have been a hard chancre, for the auto-inoculation could not have occurred so late as the middle of November. We observed the ulcer, however, between August 29th and September 2d, which could not have happened in the case of a soft ulcer. The rest of the history, together with the subsequent manifestation of the disease on December 21st, shows that infection must have taken place later. The patient, who changed

his shirt every Sunday morning, had not yet noticed an eruption on the 11th of December. On the 18th he noticed the eruption on his upper arms, and on the 19th, on his body. The exanthema which I saw on December 21st, bore all the characteristics of a first eruption.

As the secondary symptoms show themselves on an average of from five to six weeks after the first appearance of the initial lesion (in rare cases the time can be less than two or more than twenty weeks.—E. Pontoppidan), so we see that there is little ground for the supposition that the patient was infected in August. On the other hand, the appearance of the constitutional symptoms point capitally to an infection taking place on October 26th (coition in Rostock); the patient's ulcer from August was not yet covered with skin, on which account he was in a marked degree susceptible to infection; no doubt his girl had lues; the ulcer was first covered with skin toward the end of November, and on December 21st a chancre, which was as hard as the one on the eyelid, appeared on that spot.

On the 13th of November, eighteen days after coition, just at the time when we would expect the initial lesion on the præputium would begin to develop, a foreign body lodged beneath the right upper eyelid. While he was handling and examining his prepuce to look after the ulcers, he at the same time continually rubbed his eye for a whole week, until his comrade, Robert N., who, when examining him on December 21st had no symptoms of lues, removed the rust from his eye.

Here all the conditions are given to show that auto-inoculation is followed by a result, since the inoculation proceeds from the very inception of the infection on the prepuce. In the first days of December the first traces of the ulcer on the eyelid appeared, which gives just the proper incubation period, namely, three weeks, for the chancre on the eyelid.

In conclusion I will briefly endeavor to exclude other attempts at explanation. It is evident that the patient contracted both hard chancres by means of the same infection on October 26th, and that the development of the two chancres only differed in their respective incubation periods.

For instance, a chancre might have resulted through his girl's kiss. Here, however, let me observe that, upon questioning, the patient confessed that intercourse only was indulged in, but no kissing. It would be too great a flight of the imagination to suppose, with an eminent Norwegian colleague, that the infection might have occurred through the accidental coughing of saliva[1] into the patient's eye; but the examination on December 21st also shows that infection could not have taken place at the same time. Since, if the time of incubation was different, the last indurated ulcer, which took place between December 2d and 4th, would have had sufficient time to produce a primary adenitis, which is wont to appear after the occurrence of an initial lesion. While, as I remarked, that on the 21st of September the inguinal glands were as large as hazel-nuts, the pre-auricular glands were not swollen, except that only a pair of glands the size of a barley growth were visible on each side of the neck, which were not, as was previously shown, of a specific nature. That on the latter parts there was no primary gland-swelling must be explained from the fact that a general infection had already been effected at the time when this adenitis should begin.

But the assumption that the two chancres should have originated through the same infection, is presumably very small, considering that the one (the præputial chancre) had caused primary adenitis with a nut-sized gland-swelling and general infection, while the other did not even produce a primary swelling of the glands. In the meantime, the history of the disease seems to show that it is no accident that the patient developed a chancre just on the right upper eyelid. On the eyelid there was a foreign body, and that was present for a whole week; he rubs constantly, at the same time busies himself with the præputial chancre.

I will mention still another explanation: One could imagine that the indurated ulcer on the eyelid was not really a

[1] In the only cases of this kind that I know of in which a chancre of the eyelid was caused by the saliva of a syphilitic patient being coughed into the eye, the patients were physicians, who were overtaken by this misfortune while penciling the throat or the mouth of luetics. The observers were Desmarres and Fournier (de Beck, *l. c.*, No. 2, and p. 34, No. 25).

chancre, but, for example, a secondary papule on the eyelid, which, being exposed for a whole week to a strong mechanical irritation, reacted with induration and ulceration. Bidenkap[1] for a short time thought of this as a satisfactory explanation for his cases, but the same proof which he advanced against that idea holds good in the present case. The ulcer on the eyelid appeared about fourteen days before the secondary eruption; the same ulcer on the eyelid, on the 21st of December, presented an appearance so characteristic of a hard chancre, that I made a diagnosis at sight. Furthermore, Bidenkap, who commands a large experience, says that, under the most varied chemical and mechanical irritation during the second stage, he never saw produced anything resembling a hard chancre. After the above considerations, one must arrive at the conclusion that the chancre on the eyelid originated through no other means but that of auto-inoculation. In the literature on the subject I failed to find a description of a case in which a hard chancre on the eyelid was the result of auto-inoculation.[2]

Out of Dr. de Beck's 94 recorded cases no mode of infection was mentioned in 45, and only in 4 of these 45 (Nos. 2, 28, 31, and 92) he speaks of "genitals sound"; but how the condition of the genitals was in the 49 remaining cases he does not mention. An affection of these parts could certainly have been overlooked here, inasmuch as the attending syphilographer or ophthalmologist had been convinced *a priori*, that the hard chancre is not auto-inoculable. May these lines contribute somewhat towards the removal of this fallacy.

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[1] *L. c.*

[2] Possibly that was the fact in a case reported by Dr. L. W. Blickhahn, "a case of chancre in the right upper lid," the *American Journal of Ophthalmology*, July, 1891.

ACUTE RHEUMATIC OPTIC NEURITIS. — ACCOMMODATION IN THE AMAUROTIC EYE.[1]

By C. ZIMMERMANN, M.D., Milwaukee, Wis.

ALTHOUGH there are quite a number of cases of ocular palsies, in which the rheumatic nature, at first assumed, proved to be erroneous, as their further course showed them to be precursors of a serious affection of the nervous system, *e. g.*, tabes, disseminated sclerosis, or syphilis of the brain, there is no doubt that a rheumatic paralysis of ocular nerves may occur.

In regard to the *optic nerve* it has been different. Michel (*Jahresbericht*, 17, p. 381), *e. g.*, asserts that he never saw a rheumatic neuritis, and thinks that such a diagnosis would be due to a lack of knowledge as to the causes necessary for the production of optic neuritis. Leber (*Graefe-Saemisch*, v., p. 814), however, admits the possibility of its rheumatic nature, and others (Samelsohn, Hock, Haendel, Perlia, Landesberg, and others) published cases of acute optic neuritis, which, in their opinion, were due to colds. Recently Deutschmann (*Beiträge zur Augenheilkunde*, Band i., pp. 21 and 428) described seven such cases, from which he formed the following clinical picture: Sudden amblyopia of one eye (only in one case of both), or sector-like defects of the visual field, even amaurosis, with ophthalmoscopic changes of fundus, owing to inflammation of the optic nerve and its sheaths, in which no other cause than "taking cold" could be ascertained, yielding to treatment with anti-rheumatics. Almost without exception the movements of the

[1] Read before the Milwaukee Medical Society, November 12, 1895.

eye and pressing the eyeball into the orbit were painful. One case was complicated with paralysis of the abducens, two with mydriasis of the diseased eyes. In regard to the function the prognosis was favorable. After the disease ran its course, the ophthalmoscope revealed partial or total white atrophy of the disc.

I observed the following case, in which paralysis of left abducens was followed half a year later by an acute neuritis of the right optic nerve, both affections apparently due to rheumatic influences:

F. L., tanner, æt. thirty-three, came to me October 15, 1894, on account of diplopia, which he at first noticed six weeks previously. It came on suddenly with headache. After staying in bed for a few days he felt better, but now his headache is worse, and is chiefly perceived in left temple. It generally commences at 4 A.M. Gonorrhœa about ten years ago; lues denied. But the patient is very much exposed to wet and cold. His work consists in pulling hides out of cold fluid in a room in which six steam-pipes run two feet above his head, so that he perspires, and his feet get wet and cold. The diplopia was due to paralysis of left abducens. *Ophthalmoscopically:* no changes, except conus. Myopia. V with $-$ 2.00 D $= \frac{15}{15}$. Headache, and paralysis of abducens healed after administration of iodide of potassium.

May 19, 1895 he came again on account of his *right eye*, with the following history: May 10th, after a sudden fall of temperature, his headache recommenced in right side of head. He noticed that the electrie lights appeared green to his right eye and, while working, it seemed to him as if somebody stood at his right side, and was moving to his left. Finally, the sight of his right eye failed completely.

The right palpebral fissure is smaller than the left. The *right pupil* is smaller than the left, does not react to light directly, but consensually; the left reacts directly, but not consensually. Both pupils react on convergence and accommodation.

V R only motion of hand in a small area of upper nasal portion of V. F. *Ophth.: Papillitis*, swelling of optic disc = 3 D (= 1 *mm*), with œdema, veins tortuous and linked.

V L with $-$ 2.00 D $= \frac{15}{15}$. V. F. not contracted. *Ophth.:* Conus.

He localizes the *pain* mostly in the right side of his head, above

the right eyeball, and in the depth of the orbit. The *scalp* is not tender to the touch. *Urine* free from albumen and sugar. No other disease, especially no signs of *lues*. Sublimate pills were ordered. *May 22d*, still severe headache. Inunctions of ugt. hydr. cin. *May 27th*. V = 0. Considerable pain in right temple towards ear. Put to bed. Diaphoresis with natr. salicyl. *May 30th*. Headache still unabated. Four leeches on right temple. *June 2d*. The leeches relieved his headache a little. Movements and pressure on eyeball not painful. He feels as if the eye were pushed out. Iodide of potassium was given, after which, on *June 7th*, the pain in head and temple had subsided. *Ophth.:* Papillitis still at its height. *June 14th*. At upper nasal periphery of right optic disc, two small hemorrhages in the course of a vessel. Swelling of disc only = 2.00 D ($= \frac{2}{3}$ *mm*) *June 23d*. He works again, feels very well, no further pain. V = 0. Atrophy commences. *July 7th*. Papillitic white atrophy of right optic nerve is established, outlines still hazy, but no more swelling of disc. Iodide of potassium continued. *October 12th*. White atrophy of right optic disc. V R = 0. L eye and pupils as before. The patient is extremely sensitive to changes of weather and to cold. Two weeks ago, when it was very windy, he was again seized with pain in right side of head for five or six days.

Our case is in some points in accordance with the symptoms described as characteristic, in some however it differs. (1.) The onset was sudden. (2.) The affection was limited to one eye. (3.) There was previous exposure to cold. (4.) *Ophth.:* typical papillitis, ending (5), with total white atrophy. (6.) Rheumatic paralysis of left abducens had preceded. (7.) The primary disease healed after the administration of iodide of potassium, as we may infer from the alleviation of headache.

It differed in the following points: (1.) There was severe pain in head, temple, and depth of orbit, but not on movements of the eye nor on pressing the eyeball into the orbit. (2.) The pupil of the affected eye was myotic (not larger than the others, as in two of Deutschmann's cases). It acted only consensually, precluding the consensual reaction of the other pupil. (3.) The prognosis in regard to function was

not favorable, as V was not recovered in spite of the use of mercury, salicylates, and iodides.

Although there was no reason to doubt the patient's statement that he never had lues, nor for the assumption of lues insontium, as there were no signs of it, it may be mentioned that syphilitic papillitis and optic neuritis without complicating intracranial affections are very rare, and, if they should occur, they are usually bilateral (Uhthoff. *v. Graefe's Archiv*, 39, 3, pp. 149, 155). The unilateral amaurosis indicates that the affection was limited to the orbital portion of the right optic nerve, not encroaching upon the chiasm. Under this condition the severe pain in right side of head, in right temple, and depth of orbit suggest a process at the *optic foramen*, most likely a *periostitis*, as pointed out by Leber (*Graefe-Saemisch*, v., p. 815). From here a descending inflammation of the dural sheath, which is a continuation of the periosteum, and the pial septa of the optic nerve, *i. e.*, a perineuritis with optic neuritis, was propagated down to the disc. The swelling in the narrow bone canal caused such a constriction of the optic nerve that, when the patient was first seen, not only the visual fibres, but even the more resistent pupillary fibres were destroyed. Therefore a restoration of their function could not be effected, although the original cause, the periostitis itself, disappeared.

A contraction and reflex insensibility (not reflex immobility) to light of the pupil of the diseased eye, as in our case, has not been observed in those published heretofore. Deutschmann thinks that the mydriasis in two of his cases may perhaps be attributed to a slight affection of the ciliary ganglion, which lies closely near the optic nerve. This could not exist in our case, as the centrifugal pupillary nerves, coming from the ciliary ganglion, were intact,—the pupil reacted consensually and on accommodation and convergence. Cutting of the optic nerve, as done by Schiess-Gemuseus in a case of myxo-sarcoma of the optic nerve, and by Wagenmann in his experiments on rabbits, produced large dilatation of the pupil (*v. Graefe's Arch.*, 34, 3, p. 228, and 36, 4, p. 64.) Constriction of the optic nerve

by periostitic swelling probably has the same effect as cutting, so that we would rather expect mydriasis than myosis. Deutschmann (*v. Graefe's Arch.*, 28, 2, p. 293), however, observed in his experiments on sympathetic ophthalmia in rabbits extreme contraction of pupil, when he injected a ¾ per cent. solution of chloride of sodium, containing spores of aspergillus, into the optic nerve with Pravaz's syringe. A slight myosis remained for the next few days. This might have been due to an irritation of the centripetal pupillary fibres of the optic nerve. The same reason for contraction of the pupil may have been furnished in our case by an accumulation of inflammatory products within the optic sheaths. From clinical experience we know that reflex insensibility of the pupil is generally associated with myosis and not with mydriasis (Michel, *Lehrbuch d. Aug.*, p. 339).

Our case shows that the prognosis of rheumatic optic neuritis is not as favorable in regard to the function as Deutschmann asserts. It depends entirely in which stage the affection comes under treatment. If it is as far advanced as in our case, in which a destruction of the optic-nerve fibres had taken place by the intense process, recovery of function will be impossible.

ACCOMMODATION IN THE AMAUROTIC EYE.

Aside from its pathological interest, our case answered all requirements for deciding a physiological question, viz.: in regard to the equal impulse of accommodation in both eyes. Hess, Greeff, and others proved that in anisometropia the accommodation in both eyes is equal under all circumstances, and refuted the opposite opinions for some time in vogue. Greeff (*Klin. Mon. für Aug.*, 1895, p. 322) found the same in a blind eye, the fellow of which had good vision. For such tests eyes can only be used in which the accommodative apparatus is not diseased. In our case we had atrophy of one optic nerve, the eye itself, especially the ciliary nerves, being intact, with normal vision of the other eye. By means of sciascopy it could be ascertained that an

accommodation at a distance of 25 *cm*, *e.g.*, produced an additional myopia of 4.00 D in the amaurotic as well as in the healthy eye. I could make the same observation in a similar case. This shows that the impulse of accommodation is the same in both eyes, no matter whether or not there is any interest in binocular vision or in an equal muscular effort.

BILATERAL ANOPHTHALMUS AND EPICANTHUS IN A CHILD WHOSE MOTHER PRESENTED A CONGENITAL ABSENCE OF THE RIGHT EYE-BALL.

By VICTOR LAFOSSE, M.D., Jacksonville, Fla.

Last August Mr. Charles Spratt, a young student of medicine, brought to my office a case which may prove interesting from its rarity. The case was that of a child, G. W. G., male, two and a half years old, born without eyes. Upon examination, the child was found to be well developed for its age, and apparently in good health. There was epicanthus more marked on the right side ; the eyelids were normal ; the palpebral openings were rather small. Upon opening the lids, no trace of ball could be found. The optic nerve is marked by a small cup-shaped, white depression, and this point seemed to have some slight movements. At the canthus internus, the conjunctiva presents a streak of small whitish glands, vestige of the caruncle. The lachrymal apparatus is normal. The orbits were well formed, but rather small.

The head and face seemed normal ; the fontanelles closed. The other organs and functions of the body were found to be normal.

A peculiar feature of the case is that the child remains quiescent in any position it is placed. If stood upon its feet and its arm is raised, it makes no attempt to move, but remains in that position until it is changed. It makes no effort to walk, and if pushed slightly forward, it falls rather than take a step. The child seems fairly intelligent. The mother states that when it is hungry, it manifests its wants by a peculiar moan or cry ; when placed upon the bed, it frequently extends its arms and legs, and rolls from one side to the other.

Family history.—The parents are not related, but the mother presents a right anophthalmus. She states that her parents were

not related. Her father was Scotch-Irish and her mother Dutch. But when her mother was pregnant about the fifth month, she arose from her bed one night, and struck the right side of the head just over the eye, violently against the door. The pain occasioned was very severe, and she immediately put the hand over the right eye, pressing the lobule of the ear upwards. When the child (mother of this child) was born, it was remarked that the lobule of its right ear was turned up, and that it had no eye on the right side. She seems in good health but of less than medium intelligence; and maternal instinct is very nearly deficient; she complains of nothing, and declares she sees wells with the one eye.

On examination the left eye presents a horizontal nystagmus, and the woman says that as long as she remembers she has had these little jerking movements. Right side: eyelids well formed, smaller than those of the left side, especially the lower one. The orbit is also smaller, otherwise normal. Lachrymal apparatus, glands, and lachrymal points normal. Upon opening the lids the conjunctiva appears normal, presenting at the inner canthus streaks of glands, vestige of the caruncle, and a fold extending up and down and outwards and representing the plica semilunaris. There is a rudimentary ball the size of a small pea, of a bluish-gray color, and having some slight movements. The other organs, nose, ears, etc., are normal.

During the last month (October) the mother gave birth to a second child, a girl, perfectly healthy and well formed.

P. S.—Since the above article has been written, the child has been adopted by a charitable association, and placed in the care of an intelligent woman. A visit made the 10th of November assured me that the mental faculties of the child are developing rapidly. It now speaks a few words, and it walks.

ALVEOLAR SARCOMA OF THE OPTIC NERVE.

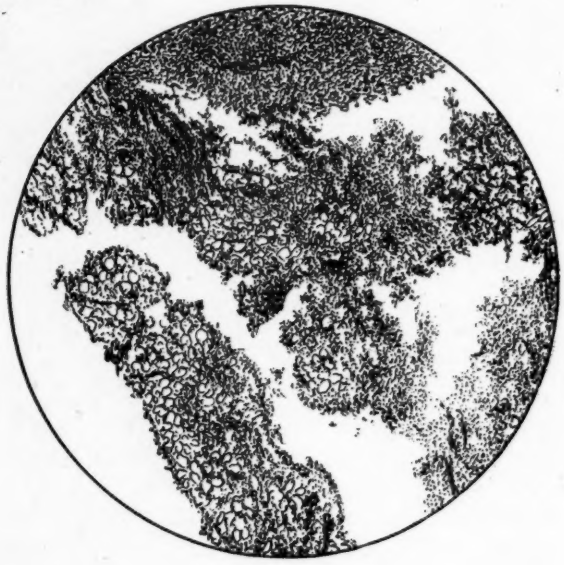
By FRANK W. RING, A.M., M.D., New York.

(*With a drawing.*)

TUMORS of the optic nerve are not infrequently reported, the literature on the subject showing data of 117 cases (Finley, ARCHIV. OF OPHTHAL., xxiv., 2, 224). The peculiarity of the case in question is in the fact of its occurring in an orbit where the eyeball had been enucleated a year previous, at which time there were no evidences of a malignant growth. The eye was enucleated at the urgent request of the patient, on account of pain; it was also atrophied, inflamed, and irritable. It was quite impossible to get a satisfactory history of the case, as the patient was a Russian and unable to speak any English; from the little German she knew, we ascertained that the eye was injured thirteen years ago, which the following will show.

Clinical history.—Rachel Horwitz was born in Russia forty-seven years ago, married at seventeen, has three children, all living. Thirteen years ago while groping about in the dark at night, she stumbled into an open door, striking the left side of the face and eyeball. Some days following, she noticed a failure of vision in the left eye, and in a few months it became quite blind. She went to Vienna and consulted Dr. Arlt, who said nothing could be done to relieve her blindness. She came to the Manhattan Eye and Ear Hospital January 9, 1894; the eyeball was then considerably atrophied, inflamed, and painful. Both for the cosmetique effect, danger of sympathetic inflammation, and especially to relieve the pain, I decided to enucleate, which was done February 7, 1894. No malignant growth was found, or sus-

pected. After the proper interval, an artificial eye was fitted and worn with comfort for a period of several months, when she began to complain of pain in the orbit, from which she would get some relief by removing the eye. In November I noticed a swelling at the base of the orbit, which increased so rapidly and was so painful, that on January 9, 1895, it was extirpated. It seemed to have a pedicle at its inferior deep attachment. The patient made an easy recovery and, after two weeks' observation, was discharged from the hospital. Several times during the next four months I was called to her house, as she was soon confined to her bed after leaving the hospital. She suffered great pain, with fever and complete loss of appetite. Indications were that she had metastasis in liver and ovaries, and she died with cerebral symptoms, April 22, 1895.



Histological Examination.—Tumor of the orbit; No. 151050, Manhattan Eye and Ear Hospital, Rachel Horwitz. Gross—Tumor about the size of a pigeon's egg, encapsuled, hard, lobulated, and of a grayish color. Microscopical.—Capsule composed of thick bands of connective tissue in the meshes of which well developed

blood-vessels are found. From this capsule prolongations of connective tissue are sent in dividing the tumor into compartments and this still into smaller ones or alveoli, these containing cells of an epithelial or endothelial type. Some degenerated nerve fibres were found in some of the sections. Diagnosis.—Carcinoma of the optic nerve.

(Signed) F. T. REYLING, M.D.

The foregoing report is from the pathologist of the Manhattan Eye and Ear Hospital; sections were also submitted to Dr. J. E. Weeks and Dr. Brooks. Their examinations resulted as follows: "The tumor you removed from Rachel Horwitz and submitted to me for examination appears to be composed of neuroblastic tissue and to belong to the form of neoplasms known as alveolar sarcoma. Although in the growth the nerve fibres of the optic nerve are included, they do not appear to take an active part in its formation. Many of the cells have the character of endothelial cells. In all probability the growth originated from the orbital tissue and from the sheath of the optic nerve, the inclusion of the nerve being secondary. The tumor should be classed with the malignant neoplasms." Dr. Brooks characterizes the growth as "alveolar sarcoma of Billroth." There was no recurrence of the tumor in the orbit after enucleation.

THE BACTERIOLOGY OF THE DIFFERENT VARIETIES OF ACUTE CONJUNCTIVITIS IN GENERAL, AND OF ACUTE CONTAGIOUS CONJUNCTIVITIS IN PARTICULAR.

By VICTOR MORAX, M.D., and GEORGE WILLIAM BEACH, M.D., of Paris.

(With three figures in the text.)

THE different varieties of acute conjunctivitis begin, thanks to the bacteriological researches of these latter years, to come out of the chaos into which pathological anatomy had plunged them. The objective aspect of the inflammatory reaction has ceased to be the only preoccupation, and an etiological classification has been progressively reached. The terms catarrhal, purulent, pseudo-membranous conjunctivitis are now insufficient if not accompanied with a qualification denoting the etiological nature. For we now know that the same infection can take on different clinical forms and that an anatomical lesion is a deceitful criterion which must be boldly cast aside as a basis of classification.

The purulent discharge of a conjunctivitis may be caused by the gonococcus, Weeks's bacillus, the streptococcus, or the diphtheritic bacillus, just as these same microbes may determine fibrinous or pseudo-membranous exudations.

These lesions evidently present distinctive characters in their evolution, but from a purely objective standpoint the different affections can be classed under the same head, since the anatomical lesion is identical. The important point is not the lesion, which is only a result, but the cause

of the lesion, the parasite that produces it. The utility of this new direction given to pathology has been sufficiently proven by the works of these latter years, and it is evident that we have but entered upon a new era in therapeutics.

Moreover, in adopting this etiological classification and in showing thereby that we attach the greatest importance to the primal cause of the affection, we find ourselves in perfect unison with the clinicians and observations anterior to the anatomical school. For a person well versed in pathology the reading of Mackenzie's treatise, for example, is vastly more instructive and satisfactory than the study of a great number of modern works on ophthalmology in which the affections are classified according to principles of pathological anatomy. This we say, of course, only in regard to the present subject, acute conjunctivitis.

The bacteriological study of acute conjunctivitis is far from being completed, but it is already possible to establish a certain number of well defined forms. This affection does not result from the development of no matter what microbe.

To provoke a conjunctivitis it is not sufficient, as was once thought, to place a staphylococcus or a streptococcus on the conjunctiva, and the exudation of a conjunctivitis does not contain several different varieties of microbes. It is evident that among pathogenic microbes there are some that develop on a healthy mucous membrane and determine a congestion without any other cause than their simple presence. Such, for example, are the gonococcus, the bacillus of acute contagious conjunctivitis, etc.

Other organisms—streptococcus, pneumococcus—can also provoke a congestion of the mucous membrane, but in this case there seems to exist a simultaneous action of other causes. Thus an infection by the pneumococcus or the streptococcus seems to especially develop consecutively to troubles of lachrymal secretion, and often in these cases the congestion is propagated from the mucous membrane of the nose or of the lachrymal ducts. As for the diphtheritic microbe, it is nearly always observed that the infection is not primitive, but a complication of a pre-existing ocular affection.

One of us has reported a certain number of typical cases. Nevertheless it sometimes happens that the two affections have a simultaneous evolution. In a normal condition there exist on the mucous membrane many germs of various species, but these germs are so few in number that in an examination of the conjunctival discharge it is difficult to stain even one or two. Under the influence of an acute inflammation these saprophytes become still fewer, so that an examination of the secretion shows the specific microbe in a state of purity. But later on, as the affection abates, the saprophytes may become more numerous.

When a conjunctival discharge containing numerous pathogenic elements—gonococci or others—is grafted on the ordinary mediums of culture there is usually no other result than the development of a few saprophytes or one or two colonies of staphylococci. For the development of such microbes as the gonococcus and Weeks's bacillus we must employ special mediums of culture—namely, those containing serum. Thus, in practice, and with the exception of diphtheritic conjunctivitis, the microscopical examination can of itself establish the etiological nature of the affection. The possibility of an accurate diagnosis by so easy a method can not fail to be considered of the greatest importance. It is our conviction that in many cases it is necessary to resort to a microscopical examination, and that especially when the practice of medicine means something higher than mere pecuniary benefit.

We do not wish to open here the question of chronic conjunctivitis, the bacteriological causes of which are much more difficult to establish. We will only say that under the microscope are often found several badly defined microbian species, or, on the other hand, as in the case of trachoma, no microorganisms whatever, a fact which by no means proves that none exist.

Let us review in a few words what has been absolutely acquired in the bacteriology of different forms of acute conjunctivitis.

[1] Morax, "La Conjunctivite diphtérique. Son traitement par le serum antitoxique." *Annales d'Oculistique*, April, 1895.

Acute Contagious Conjunctivitis.

This is one of the most common forms. It is also called acute conjunctivitis, contagious ophthalmia, catarrhal conjunctivitis, "pink eye." It invariably coincides with the presence of a small specific bacillus, discovered by Koch, in the acute conjunctivitis of Egypt, described by Weeks in America, and studied by ourselves in the acute conjunctivitis of Europe. It must not be confounded with the catarrh which accompanies a great number of lesions of the conjunctiva, cornea, and eyelids, and which does not constitute a distinct contagious affection.

Gonorrhoic Conjunctivitis.

This includes every form in which the pathogenic agent is the gonococcus (infantile ophthalmia, leucorrheal conjunctivitis of little girls suffering from vulvo-vaginitis, purulent conjunctivitis of adults). In all these forms the discharge contains great numbers of gonococci and in almost a pure state. This is easily shown either by a microscopical examination or in special methods of culture favorable to the development of this micro-organism. The microscopical examination is practically sufficient for making a diagnosis. But besides the gonorrhoic conjunctivitis by inoculation, there is to be seen, and especially in adults, a form which may co-exist or not with gonorrhoic arthritis. This spontaneous variety without inoculation has a profuse discharge, and in many cases the gonococcus is not to be found; nevertheless it is not unusual to find it in the secretion of very severe cases.

For a person that is accustomed to the manipulation of a microscope the search and recognition of the gonococcus is a very elementary matter, and confusion is impossible when care is taken to make two preparations, one with a single color (methylen blue, fuchsin), the other treated with Gram's method.

Diphtheritic Conjunctivitis.

It is characterized by the presence of the diphtheritic bacillus. The detection of this micro-organism under the

microscope in cultures is the only sure means of distinguishing this affection from forms with pseudo-membranes which are caused by other bacilli. The researches of Sourdille, Uhthoff, Elschnig, and our own show that diphtheritic conjunctivitis may have a benign or, on the other hand, a serious aspect. This form alone is affected by anti-diphtheritic serum, which has no influence on a pseudo-membranous conjunctivitis of any other origin.

The bacillus of Klebs is easily found under the microscope in the pseudo-membrane. It is often in a pure state, but frequently is found with a few streptococci, and sometimes with intra-cellular cocci. It is easily recognized from its irregular form and its staining by Gram's method.

Pseudo-Membranous Conjunctivitis of Streptococcic Origin.

This form is especially seen in children during the declining period of measles and scarlet fever, also, sometimes, independently of any febrile affection. It may accompany impetigo lesions of the face.

The evolution of this conjunctivitis is sometimes extremely rapid and the lesions of the cornea that complicate it are particularly serious. For this reason it is more to be feared than diphtheritic conjunctivitis, with which it has long been confused. The conjunctival secretion contains little else than the streptococcus. Microscopical examination and cultures on coagulated serum show the absence of diphtheritic bacilli.

Lachrymal Conjunctivitis of Streptococcic Origin.

This affection has been described by Parinaud. It comprises those cases of acute conjunctivitis which accompany the inflammatory periods in strictures of the lachrymal ducts, in pericystitis for example.

This form of conjunctivitis, although without apparent lesions of the cornea, may be complicated with hypopyon and irido-cyclitis. The scanty conjunctival discharge ordinarily contains a few chains of streptococci.

Conjunctivitis of Pneumococcic Origin.

This is an affection of early childhood, always of a benign character, and usually accompanied with coryza and watery eyes. The scanty muco-purulent discharge, examined under the microscope or in cultures, discloses the presence of encapsulated pneumococci.

By the side of these well defined clinical forms are many others whose bacteriological and clinical study has not been made. Such are, for example, infectious conjunctivitis (Parinaud), etc.

It is evident that a bacteriological examination of the conjunctival secretion is of the utmost importance in making a diagnosis. But this does not mean that in every case we are obliged to turn to the microscope before coming to a decision; objective signs and the evolution of the disease are ordinarily sufficient.

But when in doubt, a bacteriological examination will always decide the question, and in a case of pseudo-membranous conjunctivitis this examination is absolutely necessary. Experience has convinced us that although the clinical may differ from the bacteriological diagnosis, this latter, nevertheless, is always confirmed by the evolution of the disease.

Only a short time ago—and this case is similar to thousands of others—a man of thirty came to Dr. Parinaud's clinic with a bilateral purulent conjunctivitis of great intensity accompanied with chemosis but no lesions of the cornea.

He told us that he had had a gonorrhoic urethritis which ended only two or three days before the beginning of the ocular trouble. He asked us whether the conjunctivitis had any relation with the recent urethral affection and whether his eyes were in danger. From a clinical standpoint it was impossible to reply, but a microscopical examination showed us the absence of gonococci and the presence of a great number of small slender bacilli, some intra- and some extra-cellular. Thus we found an acute contagious conjunctivitis instead of one of gonorrhoic origin.

We reassured the patient, and after several days' treatment (one silver nitrate instillation a day, solution at 1:40), the affection terminated in complete recovery.

We have frequently seen cases of acute contagious conjunctivitis that had been considered of gonorrhoic origin. Nothing is simpler, however, than to examine the conjunctival secretion, and the physician should learn to manipulate the microscope just as he learns to use the ophthalmoscope.

We have devoted much time to the clinical and bacteriological study of acute conjunctivitis, and, like many others, have noticed that the most frequent variety is acute contagious conjunctivitis. It is to this form that we have given particular attention. When we began our researches no work had yet been done in France on this subject, and it was of special interest to see whether the affection was identical with that which had been studied by Koch and Weeks. The following pages contain the results of our research and observation.

Acute Contagious Conjunctivitis.

The affection that we propose to describe under this name is characterized, as we have already said, by a special microorganism which has received the name of Weeks's bacillus. This variety of conjunctivitis can take on different clinical forms according to the intensity of the congestion. It may in certain cases be accompanied with lesions of the cornea. Though frequently appearing in epidemics it can also exist in isolated cases. But whatever be its clinical aspect it is always contagious. In general, transmission is direct and, apparently, by simple contact only. No other variety of conjunctivitis presents the same pronounced signs of contagion and diffusion. On account of this characteristic it formerly received the name of contagious ophthalmia.

We abandon the name of catarrhal conjunctivitis which one of us gave to this affection in a recent work,[1]—considering with Weeks that acute contagious conjunctivitis is a more accurate denomination.

[1] Morax, Recherches Bactériologiques et Cliniques sur la Conjunctivite Catarrhale. *Annales d'Oculistique*, December, 1892, vol. cviii., p. 393.

The adjective catarrhal—based on the microscopical aspect of the secretion—is not precise, as it cannot be applied to severe cases in which the discharge is purulent.

It is unnecessary to give a complete history of acute contagious conjunctivitis, as the disease in itself has been known for a long time. We will simply trace with as great precision as possible the etiology, symptomatology, and different clinical forms of this affection.

Etiology.

In frequenting an ophthalmological clinic, a very short time is sufficient to notice that among the different varieties of acute conjunctivitis there is one whose contagion is unrivalled; that often several children belonging to the same family or going to the same school all come at one time to be treated for affections which differ from one another only by the intensity of the symptoms or by some secondary sign. Whatever be the season of the year one is also impressed by the extreme frequency of this form of conjunctivitis. It suddenly makes its appearance in a neighborhood or in a school. All, whether children or adults, pay tribute to the epidemic; then, during months, only isolated cases are observed, but whose source of contagion it is nearly always easy to trace.

There exist in medical history numerous accounts of these epidemics. We will not describe them, as their precise nature cannot be vouched for, on account of the absence of bacteriological examination, the importance of which we demonstrate farther on.

The first bacteriological researches on the different forms of acute conjunctivitis date from 1883, and were made by Koch[1]; in the conjunctival discharge of Egyptian ophthalmia he sometimes recognized the gonococcus, in other cases a small slender bacillus, analogous to that of the septicæmia of mice. This microscopical observation permitted him to separate these two forms of conjunctivitis.

In 1885 Weeks[2] studied an acute conjunctivitis which was

[1] Koch, *Wiener med. Wochenschrift*, No. 52, 1883, vol. xxxiii., p. 1550.

[2] Weeks, "The Bacillus of Acute Conjunctival Catarrh or 'Pink Eye.'" ARCHIVES OF OPHTHALMOLOGY, 1886, vol. xv., pp. 441–451.

epidemic in America, and which had received the vulgar name of "pink eye." We will rapidly review this work, which is very complete.

The first patient that Weeks examined was the mother of two children, both of whom had suffered from acute conjunctivitis, without lesions of the cornea, two months before.

The infection in this case was very intense and was attended with marked frontal cephalalgia and coryza. The burning, and sensation of a foreign body in the eye, made sleep impossible. The micro-purulent discharge was abundant.

On examining the conjunctival secretion under the microscope Weeks was struck by the great number of small bacilli corresponding exactly to Koch's description.

He inoculated the secretion on the conjunctiva of a rabbit, but with negative results. He next inoculated six conjunctivæ of five patients and obtained in five cases an acute conjunctivitis, in the secretion of which he found the same small bacillus. The attempts at cultures which he made, using the method of isolation with gelatine plates or agar, gave him no positive result. On agar at 0.3 or 0.5 per cent. he obtained small colonies in which, in addition to the specific bacillus, there existed a micro-organism which stained more deeply and often presented a club-shaped extremity.

He did not succeed in isolating the specific from the club-shaped bacillus, but he was able to obtain several generations of the mixture of the two microbes. In the cultures he observed that the specific bacillus varied considerably in length; that it could form filaments and chains by the juxtaposition of several joints; that it could be stained by a watery solution of anilin, but that double staining was impossible. As it was easy to isolate the club-shaped bacillus from the specific agent, whereas the inverse was impossible, Weeks inoculated the club-shaped bacillus five times on the human conjunctiva, and that without producing any pathological reaction. The inoculation of the mixture of the two bacilli provoked in each of six cases an acute conjunctivitis of

variable intensity, which showed itself forty-eight hours after inoculation. In each case he discovered the presence of the bacillus in the conjunctival secretion.

Having excised a small fragment of the membrane near the conjunctival sac, Weeks looked for the bacillus in the tissues. He found it nowhere except in the superficial layers of the epithelium, and there only in small numbers.

At the time of his first publication Weeks had found the same bacillus in more than a hundred cases of conjunctivitis; in the communication he made to the Congress of Berlin in 1890[1] he said that he had seen it in more than a thousand cases.

In 1887 Kartulis[2] took up the study of this disease in Egypt and found the same small bacillus already described by Koch. On agar he obtained pure (?) cultures, which formed a very apparent ray of greasy aspect and of dark color, and which, transplanted on gelatine, developed slightly (?). Out of six inoculations on the human subject Kartulis had but two cases of acute conjunctivitis. We do not attach great importance to the work of this author, for the description he gives of the cultures does not correspond to what Weeks had observed nor to what we have ourselves seen.

In France there had been no bacteriological study of acute contagious conjunctivitis when we began our researches in April, 1891.

The first cases that came under our notice at Dr. Parinaud's clinic belonged to the classical forms of epidemic acute conjunctivitis. This epidemic started in Rue Gabrielle at Batignolles. In the houses Nos. 15 and 17 thirty persons were taken with this affection in the space of three or four days. Eight of these patients came to be treated at the clinic, and in their muco-purulent discharge we discovered the presence

[1] Weeks, "The Pathology of Acute Contagious Conjunctivitis." *Transactions of the Tenth International Medical Congress*, Berlin, 1890.
Also: "The Status of our Knowledge of the Ætiological Factor in Contagious Conjunctivitis." *New York Eye and Ear Infirmary Reports*, vol. iii., part i., January, 1895. p. 24.

[2] Kartulis, "Zur Aetiologie der Aegyptischen catarrhalischen Conjunctivitis." *Centralblatt für Bacteriologie und Parasitenkunde*, 1887, No. 10, vol. i., p. 289.

of a small bacillus which corresponded exactly to the description of the one that Koch, Weeks, and Kartulis had studied. Since that time we have examined a great number of cases and have been able to establish that this bacillus was the specific agent of a very frequent and extremely contagious form of conjunctivitis, which exists in all regions and at all seasons, sometimes as an epidemic, at others in isolated cases, and which is identical with the disease that Weeks studied in the United States and Kartulis in Egypt.

Experiments as well as clinical observation have demonstrated that there exists a period of incubation which lasts from two to three days. After an inoculation with a pure culture the conjunctivitis develops at the end of forty-eight hours. When one eye is infected the other eye is attacked two or three days later.

Bacteriology, Pathological Anatomy, Microscopical Examination of the Conjunctival Secretion.

The conjunctival discharge, spread out on slides, is fixed by heat or, even better, by a drop of corrosive sublimate (in this latter case the slide must be washed before staining). It is stained with a carbolicized solution of methylen blue or of diluted methyl violet, then washed in water, allowed to dry, and mounted in Canada balsam. In the microscopical examination a lens of considerable power should be used, —a $\frac{1}{12}$ immersion objective and a No. 3 eye-piece.

Under these conditions are seen numerous leucocytes containing one or several nuclei of great size. These nuclei are of roundish or irregular form, and are deeply stained by blue while the protoplasma is little or not at all colored.

These cells are isolated in some places, and then are more or less regularly rounded, in others they are grouped together in masses. Between these cells and in the depth of their protoplasm can be seen very short slender rods that stain less deeply than the nuclei, but which stand out distinctly against the surrounding protoplasm. These small bacilli are sometimes isolated or united by their extremities so as to form chains of two or three joints. Often they are

juxtaposed. They have been compared to the bacillus of the septicæmia of mice. Nevertheless they are rather more slender than these latter. The extremities are rounded. Sometimes their two poles are more deeply stained than the centre. Their number on a slide is variable; it depends upon the intensity and period of evolution.

FIG. 1.—Secretion in a case of acute contagious conjunctivitis. Weeks's bacillus in and on poly-nuclear leucocytes.
$\frac{1}{12}$ immersion, eye-piece III. Zeiss.

FIG. 2.—Conjunctival secretion during the first days of the affection. A few bacilli in and on the cells.

FIG. 3.—A pure culture of the bacillus of acute contagious conjunctivitis.
$\frac{1}{12}$ immersion, eye-piece III.

During the first days the bacilli are few in number. Nevertheless, upon looking over the preparation several are to be seen either in a free state or englobed in phagocytes. After the third or fourth day of the inflammation they become very numerous and are easily recognized. In certain intense

cases there is hardly a cell that does not contain one or more. Sometimes the cellular protoplasm is literally crowded with them.

By the side of this specific bacillus hardly any other foreign micro-organism is to be found in the preparations. Sometimes there may be seen bacilli of considerable dimensions, but in an isolated state and incapable of ever producing confusion ; if the slide is treated by Gram's method Weeks's bacillus no longer remains stained.

This is a very important element of distinction. It will be seen by what we have just said that the bacillus of acute contagious conjunctivitis presents morphological characteristics and staining reactions that allow it to be easily recognized in preparations without it being necessary to make cultures for a diagnosis.

Cultures.

Cultures of Weeks's bacillus are quite difficult to obtain. When the conjunctival discharge is grafted directly on beef-tea or gelatine it is rare that colonies of the specific microbe are to be found. It often happens even that no foreign micro-organism whatever is developed. If agar is used, a culture is sometimes obtained after two days. This culture is barely indicated by a slight roughness on the surface of the medium. To obtain fine cultures it is indispensable to take the secretion of a very intense conjunctivitis, and there seems to be a direct relation between the vitality of the microbe and the intensity of the infection. Under these conditions an abundant development can be obtained even on ordinary 1½ per cent. agar (agar made without maceration of meat, with peptone and chloride of sodium, has given us good results). It is also necessary that the surface of the agar be moist. To this end it is well to cork the tubes as soon as they are prepared, and thus prevent the evaporation of the water of condensation. But we have remarked, as has also Weeks, that 0.5 per cent. agar constituted a more favorable medium for the development of this bacillus.

At this percentage agar has little consistence and adheres badly to the sides of the tube. The best way is to use Petri

boxes. The grafting is done on the surface with a pipette after cooling. These boxes are placed in the incubator at 35° Centigrade. After twenty-four or thirty-six hours there appear fine points about the flutings made by the pipette. These points are formed by small transparent colonies, hardly distinguishable on the surface of the agar. These are groups of Weeks's bacillus. By their side can generally be seen other colonies, rather more spread out, which reach a diameter 0.5 to 1 millimetre, and which form a small gray spot much more distinct than the first.

These latter colonies are formed by a small bacillus re-staining by Gram's method and often presenting involuted club-shaped forms. It is the micro-organism to which Weeks has given the name of club-shaped bacillus. It is frequently found in different varieties of conjunctivitis. We have observed it in cases of infantile ophthalmia and even on normal conjunctivæ. Cultivated in beef-tea it forms a small deposit without clouding the liquid; its development is always scanty. We have not succeeded in cultivating it on potato or on gelatine. The bacilli are juxtaposed, for the most part rectilinear, but in each group can be seen one or two elements presenting a club-shaped extremity. Inoculated in mice and guinea-pigs this club-shaped bacillus gives rise to no pathogenic reaction.

When the colonies of the specific bacillus are grafted in a new box it frequently happens that the culture is no longer reproduced, especially if the original culture is more than from three to five days old. Moreover these colonies often develop slightly, while those of the club-shaped bacillus grow more abundantly. It is easy to isolate this club-shaped bacillus from that of acute conjunctivitis; but on the other hand we have had no more success than had Weeks in isolating the specific bacillus from a culture in which the two microbes had developed.

As we have shown, Weeks's bacillus develops badly on ordinary mediums, and when it is a conjunctivitis of small intensity there is often no development at all.

The most appropriate mediums for the culture of this micro-organism are the same as those on which develops the

gonococcus. The best one is a mixture of human serum and peptonized agar. A sterile serous exudation (liquid of ascites, hydrocele, ovarian cyst) may be substituted for the serum. To obtain the isolation of Weeks's bacillus we inoculate the water of condensation of a tube of the above mixture. The liquid first inoculated is diluted and used to graft the water of condensation of a second tube, then a third. The tube is then so inclined that the whole surface of the agar is moistened, then it is placed upright in the incubator. Under these conditions it is relatively easy to isolate the specific bacillus and its reproduction on the mixture of agar and serum is obtained without difficulty.

On this medium Weeks's bacillus forms small punctiform colonies which are very transparent and but little spread out, and which greatly resemble colonies of the influenza bacillus. The addition of human serum to peptonized beef-tea gives a good culture in this medium. It is rare that pure cultures are obtained at once. Nevertheless in inoculating ordinary mediums without addition of serum, taking the conjunctival discharge of adult patients suffering from very intense conjunctivitis, we have succeeded three times in obtaining pure cultures.

In beef-tea and serum the culture gives a somewhat flaky crystalline aspect.

Cultures on the other mediums employed in bacteriology —gelatine, aqueous humor, potato, filtered milk, liquid serum, albumen of egg coagulated or not, etc.—have never given us any results.

At different times we have tried to cultivate this microbe in the lachrymal secretion, either by placing in the incubator pipettes containing the discharge of acute conjunctivitis or by inoculating tears arranged in hanging drops. Under these conditions we have never seen the bacillus develop, a fact which can be explained by the inferior nutritive qualities of the conjunctival secretion.

Study of the Bacillus in Cultures.

This micro-organism is devoid of movement. It stains by the different anilin dyes but not deeply. It does not stain

by Gram's method. The bacilli are juxtaposed in small clusters. Some of them are short, having the same dimensions as in the conjunctival discharge; others are filiform, attaining a length three or four times greater than that of the other elements. This bacillus is stained uniformly, and no endogenous or exogenous formations are found that might lead us to suspect the existence of spores.

Its vitality in cultures is of short duration. After several days the inoculations of colonies nearly always give negative results. In mediums to which serum has been added the bacillus lives a little longer, but not all inoculations give positive results.

When an attempt is made to stain the bacilli in a culture more than a week old it is to be remarked that they color less easily and that a great number of them remain unstained. In cultures that are still older no element whatsoever is stained and the bacilli are no longer to be distinguished.

Inoculations.

Inoculations on Animals.—Experimental inoculations were made either with conjunctival secretion, taking care to choose cases in which the bacilli were very numerous, or with cultures that were pure or mixed with club-shaped bacilli. These inoculations were made on dogs, monkeys, rabbits, guinea-pigs, mice, chickens, and pigeons. In all these different animal species the results were constantly negative, let the method of inoculation be what it might: injections in the conjunctival sac with or without previous irritation of the membrane, sub-conjunctival injections, etc.

We have also inoculated a culture after having provoked with jequirity an intense conjunctivitis. The injection of a culture in the anterior chamber of a rabbit produced no reaction. Under the skin of a mouse it determined no trouble, and, twenty-four hours later, no bacilli were to be found at the spot inoculated.

Thus we see that Weeks's bacillus presents no pathogenic action on animals. But it is not the same for man.

Inoculation on Man.—On the 17th of October, 1893, one of us was inoculated with a culture of the bacillus of acute

conjunctivitis diluted in sterilized water. With a pipette Dr. Nicolle placed one drop of the dilution in the inferior cul-de-sac of the right eye. The graft was from a third generation on agar cultivated in a state of purity, and coming from Mrs. E., the clinical notes of whose case we will now give (Case I.). The inoculation took place without previous irritation of the conjunctiva.

Case I.—Mrs. E., aged twenty-eight years, presents herself October 12, 1893, at Dr. Parinaud's clinic. She has a very severe acute conjunctivitis. The affection made its appearance a week ago; the left eye beginning two days after the right. The eyelids are glued together in the morning on awakening; they are extremely swollen and of a violet color. The muco-purulent discharge is profuse. The conjunctiva is uniformly congested and presents a bright red surface. No corneal trouble, no pre-auricular adenopathy.

The patient complains of photophobia, sharp pains in the lids, and severe burning.

By means of cauterizations with nitrate of silver (solution at 1:40) there is a rapid amelioration, and the patient recovers one week later.

Bacteriological Examination.—The conjunctival secretion contains numerous intra- and extra-cellular bacilli.

Cultures.—On agar we immediately obtain a pure culture indicated by scattered groups of small colonies hardly distinguishable from the surface of the agar and resembling somewhat colonies of the pneumococcus. This culture is inoculated twice consecutively and with success. The fourth tube remains sterile. With the third generation two inoculations are made; one on man with positive results, the other on a monkey. This latter experiment produces no reaction.

The following shows the result of the inoculation on our own conjunctiva.

During the first two days there is no discharge and no subjective sign. October 20th, three days after inoculation, the right eyelids are glued together upon waking. The conjunctiva is somewhat congested. There is lachrymation and a slight muco-purulent secretion which, becoming hardened, forms yellowish masses at the inner angle of the eye. The next day the lids are

swollen, violet, and glued together on waking ; the discharge is profuse ; the congestion has increased. Annoying lachrymation. No marked subjective signs. Drs. Terrier and Parinaud observe every symptom of a well-characterized acute conjunctivitis.

No treatment being applied the following days, the symptoms become more marked. The discharge is profuse ; functional troubles more pronounced. At first there is a continual burning, and a sensation of a foreign body in the eye. Pressure on the lids is very painful ; the muco-purulent exudation, which is brought across the cornea by the movements of the eyelids, blurs the vision. Towards evening the pain is still more intense and makes sleep impossible.

October 23d.—The left eyelids are glued together, and there is a slight muco-purulent discharge on this side. From this time on, cauterizations with nitrate of silver (solution at 1:50) are made daily.

October 24th.—The right eye is no longer sensitive, and there remains nothing more than a little congestion with a small amount of secretion ; but the left eye has become extremely painful ; it is congested ; the conjunctiva presents a slight degree of chemosis. No lesion of the cornea. The sensation of foreign body continues and renders all work impossible. Slight photophobia. This state continues up to October 27th in the left eye only, while the right eye has almost regained its normal condition.

October 28th.—The eyelids are no longer painful. Less congestion. The cauterizations are discontinued the 29th of October. The lids are still glued together for five or six days after this date and work in a strong light determines some fatigue.

The pre-auricular glands have not been swollen at any time.

October 28th, and the following days, there was a furfuraceous desquamation of the eyelids.

Finally, two days after the beginning of the conjunctivitis, a slight coryza made its appearance, lasting forty-eight hours.

In regard to treatment we would call attention to the fact that, in spite of the violent pain caused by the instillations of nitrate of silver, it is nevertheless these that give the greatest alleviation, and to such an extent that instead of being feared they are desired. Let us add that cauterizations with a solution at 1:100 are quite as painful as those at 1:50, and are not followed by the same good results.

Bacteriological Examination.—Day by day we are able to examine the conjunctival secretion. The first day the bacillus is found in very small numbers, and it is necessary to go over a considerable surface of the preparation in order to discover a few rare microbes that are free or included in leucocytes. These latter are but little altered, their outline is distinct, their nuclei well stained and not deformed. There exist also a few epithelial cells. The cultures made with the first day's secretion remain sterile. The second day the number of bacilli is slightly increased, but it is still necessary to look attentively and to be well acquainted with this micro-organism in order to find it. No other microbes are to be found.

From the third day onward the number of bacilli is much greater, to such a degree, in fact, that the bacteriological diagnosis can be made without hesitation.

Many bacilli can be seen inclosed in leucocytes, but we do not find cells crowded with bacilli as can be observed in cases of intense conjunctivitis. On the fifth day these cells exist in great numbers. The leucocytes are still more altered. The nuclei are less distinctly outlined, and some of them are less stained. The number of epithelial cells is increased. The tubes that are inoculated the third day show abundant cultures that are pure from the first. The colonies are more scattered than ordinarily, and the aspect of the culture resembles somewhat that of the pneumococcus. Cultures on agar are the only ones to develop. Tubes of beef-tea, gelatine, and potato remain absolutely sterile even after the third inoculation.

The bacillus remains in the discharge up to the ninth day, but the daily cauterizations with nitrate of silver have diminished their abundance to a great extent.

October 30th.—Ten days after the beginning, we no longer find the bacillus in the conjunctival secretion, and in spite of the fact that the lids still remain glued shut in the morning. This secretion contains only some leucocytes and a few epithelial cells.

On *October 13th* we had inoculated a monkey, making a subconjunctival injection of the same culture, and taking care to irritate the membrane with the canula of the syringe that had been employed for the inoculation. In spite of the gravity of this inoculation, there was no conjunctival reaction, and at no time could the specific bacillus be found in the conjunctival sac.

This experiment seemed conclusive and we have never repeated it on other subjects, especially as we saw in our own case that acute contagious conjunctivitis could not be inoculated without great inconvenience.

The following deductions may be drawn from this experiment: the bacillus which is found in acute conjunctivitis, and of which we have succeeded in obtaining pure cultures, is certainly the specific agent of this disease.

This bacillus is inoffensive for animals and has no pathogenic action except on man. Even here its action seems limited to the conjunctiva and perhaps to the pituitary mucous membrane. Its development on the human conjunctiva may be quite independent of other causes, such as cold or wind. The affection declares its presence after an incubation of two or three days. During the first few days the conjunctival discharge contains but few bacilli, but in a short time they are so numerous that a rapid microscopical examination is sufficient to make a certain diagnosis.

We would add, moreover, that the acute contagious conjunctivitis of Europe is identical, not only from a clinical but from a bacteriological standpoint, with the acute conjunctivitis observed by Weeks in New York and by Kartulis in Egypt.

Pathological Anatomy.

It was desirable to know the exact nature of the lesion and the seat of the pathogenic agent. To this end on the third day there was excised a small fragment of the conjunctiva close by the cul-de-sac. This fragment was fixed by acetate of mercury and mounted in paraffine. The sections showed as follows: the epithelial covering of the conjunctiva presents no solution of continuity. In certain points between the cylindrical and calyciform cells which compose the superficial layer may be seen a few leucocytes. These leucocytes are much more numerous in the superficial layers of the epithelial covering.

In the subjacent layers exist numerous leucocytes which penetrate the cellular tissues. The blood-vessels are abundant and dilated. In their lumen may be seen many

leucocytes for the most part laid along the coating of the vessel. The lymphatics are also dilated and filled with leucocytes. The diapedesis is especially marked in the sub-conjunctival lymphatic masses.

To ascertain the presence of the specific bacillus in these sections, we employed methods indicated by Dr. Nicolle for seeking in tissues those micro-organisms that do not stain by Gram's method. The section is stained with a solution of thionine in diluted carbolic acid, washed in absolute alcohol until there is no more decoloration, and, after clarification, mounted in Canada balsam.

Then on the section small groups of bacilli are to be seen between the superficial epithelial cells and in the depth of the leucocytes that cover the epithelial layer. None existed in the midst of the tissues. It was in vain that we sought them among the sub-epithelial agglomerations of leucocytes.

We found the same lesions in a child who had been suffering from an intense conjunctivitis for the last five days. These lesions, in short, are the same as those met with in all acute inflammations, and show nothing peculiar except it be the pathogenic agent which determines them. This latter, like the gonococcus, seems to develop on the surface of the mucous membrane, provoking an energetic phagocytic reaction.

Symptomatology.

For our description we will take a form of medium intensity, considering especially the cases that are met with most frequently, and not forgetting our personal sensations. The affection comes on without any secondary cause. Patients often call attention to an exposure to wind or cold as the cause of their trouble, but it is easy to make sure that this is of no etiological importance.

This disease respects no age, yet is a little more frequent in children on account of contagion in schools.

It is upon waking in the morning that the first symptoms are to be observed. The eyelids are glued shut, and a slight effort is necessary in order to open them. At the inner angle and at the base of the lashes are small yellowish

masses. Exaggerated lachrymal secretion, congestion of the ocular and palpebral conjunctivæ. The inferior conjunctival sac contains yellowish filaments floating in the secretion. At first the affection is ordinarily unilateral, but very soon attacks the other eye. Subjective signs are but little pronounced. At the most there is a stiffness of the eyelids and a slight pricking sensation. The vision is unaffected, except sometimes by an abnormal lachrymal secretion and the passage of fibrinous matter before the cornea.

Towards evening the hypersecretion increases, and the resulting epiphora irritates the lids and causes a burning sensation. At the same time there exists a painful sensation of foreign body, as of sand rolling over the eyeball. The following days these phenomena increase in intensity. The concretions are more abundant, and form constantly in the inner angle of the eye and in the conjunctival sac. Lids bloated and somewhat violet. Palpebral orifice contracted. The increasing congestion is in general uniform, but at some points it may seem more marked on account of intra-conjunctival hemorrhages.

The eyeball is of a rosy tint. Thus in America the disease has been vulgarly denominated "pink eye."

In the sclero-corneal region is seen a projecture of the edge of conjunctival insertion, indicating a slight œdema of this membrane. The eyelids are sensitive to pressure, and the movements of the eyeball determine some pain. The subjective troubles increase in variable proportions. There may be some photophobia. The palpebral pain and sensation of foreign body sometimes become tormenting enough to prevent sleep and render all work impossible.

During two or three days the conjunctival hyperæmia increases considerably. The palpebral portion of the conjunctiva is of a bright red; it is also congested on the eyeball. The discharge, whether collected on a slide or in a pointed tube, is always distinctly cloudy.

In the vast majority of cases the inflammation gains the second eye, and that on the second or third day of the disease. This allows the clinician to distinguish acute conjunctivitis from other varieties, but this is not a constant

phenomenon, especially when treatment has been applied in the early stages. Between the second and fourth days an inflammation of the nasal mucous membrane is frequently observed. This inflammation is often so slight as to pass unnoticed; in other cases, however, it is very severe, and lasts several days. It is limited to the pituitary, apparently never reaching the naso-pharynx. There are no phenomena of general infection; however, in very severe cases, the violent pain and insomnia may affect the general health.

The painful symptoms last about a week, especially if there has been no treatment; then the secretion diminishes, pain ceases, and the congestion is less pronounced, but the eyelids are still glued together upon waking. As long as this last sign persists the affection is not completely cured, and the patient may still transmit the infection.

In general the disease does not last more than two or three weeks, but there is a marked difference between the cases that are treated and those that are not.

The symptoms of acute contagious conjunctivitis are often less distinctly characteristic. Light forms are quite common. In these cases the discharge may be profuse with but little congestion of the membrane. There is no pain and the eyelids are not swollen. But there is no relation between the benignity of the symptoms and the duration of the disease; frequently these light forms last much longer, to such a point even as to almost be considered as cases of chronic conjunctivitis. In one case among others we found the specific bacillus after six weeks; in another the affection had begun three months before.

In children suffering from a mild form small conjunctival phlyctenulæ are sometimes to be seen. These phlyctenulæ are about the size of a pinhead or of a millet seed. They are slightly yellowish, and are to be distinguished from those of phlyctenular conjunctivitis by the absence of vascularization about the lesion and the existence of a small quantity of liquid in the phlyctenulæ. It is well known that in phlyctenular conjunctivitis the phlyctenulæ are in reality small papulæ formed by an accumulation of leucocytes. In

acute conjunctivitis they are veritable phlyctenulæ, that is the exudation of serous matter lifting up the conjunctival epithelium.

It is unnecessary to reproduce here the history of mild or medium forms of acute conjunctivitis. We have examined more than a hundred of these cases, and have always found the specific bacillus. We will, on the other hand, give the details of some other cases which present special interest either on account of their form or by reason of their complications.

It is easily understood that acute contagious conjunctivitis may attack infants. Professor Panas (Congrès d'Ophtalmologie de Paris, 1891) has reported one case.

We had occasion to examine one at Dr. Parinaud's clinic.

Case II.—L., fourteen days old, is brought to the clinic by its mother, December 25, 1891. For the past four days the child has had a mild attack of conjunctivitis. There is a muco-purulent discharge. The affection began in the right eye, then gained the left. The eyelids are swollen. The mother has no leucorrhœa. A brother of the infant had acute conjunctivitis two weeks ago. Complete recovery in ten days' time is obtained by daily cauterizations with a 1:50 solution of nitrate of silver.

Bacteriological Examination.—The conjunctival discharge contains numerous slender rectilineal bacilli that do not stain by Gram's method. The leucocytes also contain a great number of them. There are no intra- or extra-cellular gonococci.

Severe Forms—Complications.

Besides these comparatively benign forms there are others that are much more intense and to which we desire particularly to call attention, as up to the present time they have not been classed with the preceding forms.

The lids are violet, ecchymotic, and swollen to such a degree that the eyes are completely covered, and the patient can no longer open them. The abundant discharge is distinctly purulent and there is great pain. The ocular conjunctiva presents a slight chemosis, and the least pressure on the palpebral region causes sharp pain. In some cases the palpebral conjunctiva is covered with a whitish pseudo

membranous exudation. This can easily be removed by passing a piece of linen over the diseased surface.

In the following case the pseudo-membranous exudation was very plain. All the cases we give in this study were observed at Dr. Parinaud's clinic at Paris.

CASE III.—C., aged thirty-two years, comes September 19, 1891, to be treated for purulent conjunctivitis. It began in the right eye four days ago, the left eye is inflamed since yesterday only. Intense congestion. Several sub-conjunctival hemorrhages. On the congested surface of the palpebral conjunctiva is a pseudo-membranous exudation of grayish-white color which is easily removed and hardly adheres to the membrane. This latter presents no ulceration on the points from which the exudation has been removed. The discharge is profuse and of a purulent aspect. There are no corneal troubles. The lids are bloated and violet. No swelling of the pre-auricular gland. Intense photo phobia and pain about the orbit. Daily instillations of nitrate of silver bring about a speedy amelioration, and recovery is complete ten days after the beginning of the treatment.

Histological and Bacteriological Examination. — The pseudo-membranous exudation is composed of mono- and poly-nuclear leucocytes united by filaments of fibrin. There are but few epithelial cells. In the protoplasma of the leucocytes are to be seen many short slender bacilli that are decolorized by Gram's method. The same elements are found in the conjunctival secretion. The bacilli also exist outside of the cells. The inoculation of the false membrane in beef-tea gives rise to no development. On ordinary agar there develop small punctiform colonies of Weeks's bacillus and the club-shaped bacillus.

Patients often complain of an acute spontaneous pain in front of the pinna of the ear in the region corresponding to the condyle of the inferior maxillary. Pressure is also painful at this point, and the swollen pre-auricular gland can be felt the size of a hazel-nut.

We have seen a certain number of these cases in which the pre-auricular adenopathy and the acuteness of the pain seemed to give a special character to the conjunctivitis.

This adenopathy persists a few days, then disappears little by little as the conjunctivitis diminishes. We have always

observed that cauterizations with nitrate of silver suppressed the pre-auricular pain in two or three days.

We wish to report several cases of conjunctivitis accompanied with pre-auricular adenopathy. We have always found this adenopathy in severe forms of this affection complicated with lesions of the cornea.

CASE IV.—F., aged six years. November 21, 1893, the child comes to the clinic. He has always enjoyed good health. The ocular affection began three days ago in the left eye. The parents say that the children with whom he plays have had conjunctivitis for the last three weeks. The congestion is intense. The left lid is so swollen that the patient cannot keep the eye open. The affection gained the right eye on the third day.

Since yesterday both eyes are completely closed. The lids are bloated and violet. When an attempt is made to separate them there flows out a grayish secretion.

The conjunctiva is intensely congested. The pre-auricular glands are swollen and sensitive. Spontaneous pains in these regions. No insomnia. By means of daily cauterizations with nitrate of silver these phenomena rapidly disappear. After two days the patient can open and shut his eyes, and recovery is complete one week after the beginning of the treatment.

Bacteriological Examination.—The conjunctival discharge contains many bacilli of Weeks, which are both intra- and extra-cellular.

CASE V.—Mrs. C., thirty-four years old, comes to consult, December 16, 1891. She has suffered the last three days from a severe acute conjunctivitis of the right eye, with profuse muco-purulent discharge. The corresponding pre-auricular gland is the size of a hazel-nut; it is sensitive to touch and the seat of spontaneous pains. Under the influence of cauterizations with nitrate of silver the congestion rapidly diminishes. The adenopathy becomes painless and disappears six days after the beginning of the treatment.

Bacteriological Examination.—The conjunctival secretion contains numerous bacilli of Weeks.

CASE VI.—T., aged thirty-six years, presents himself December 16, 1891. The left eyelids are bloated. The conjunctiva is congested and ecchymotic. Profuse muco-purulent discharge. Violent pain in the eyeball, and in the pre-auricular region where

the gland can be distinctly felt. The microscopical examination of the secretion shows that it is a case of acute contagious conjunctivitis.

CASE VII. Mrs. R., aged thirty-four years, was examined December 23, 1891. Considerable bloating of the lids, which are of a violet color. There are congestion and some œdema of the conjunctiva. The pre-auricular glands are swollen and painful not only to touch but spontaneously.

There are great numbers of Weeks's bacilli in the conjunctival discharge.

Lesions of the Cornea in Acute Contagious Coujunctivitis.

In certain cases, which are fortunately rare, nevertheless, considering the great frequency of this disease, lesions of the cornea may be observed. Farther on we give the history of six cases that we examined during the years of 1892 and 1893. In these six patients the symptoms were so intense that without bacteriological examination a diagnosis of gonorrhoic conjunctivitis might have been made. In five cases the lesion of the cornea consisted of a central infiltration, which produced a small opaline spot situated in the centre of the cornea, and whose edges became lost in the surrounding healthy tissues. This infiltration occupied the superficial layers of the cornea.

With the nitrate of silver treatment these lesions all rapidly disappeared without leaving any opacity of the membrane.

In one case, finally, the corneal trouble was very marked. There were superficial ulcerations accompanied with hypopyon. Nevertheless, even in this case recovery was obtained by prolonged treatment, but there remained central films which later on necessitated an optical iridectomy.

In his remarkable study on acute conjunctivitis, Weeks declares that this disease is never complicated with lesions of the cornea, and that when these exist there is a superadded affection.

The facts that we report seem absolutely demonstrative, and the absence of other pathogenic microbes in the secretion shows that there was no superadded disease.

CASE VIII.—P., aged thirty-four years, is examined at the clinic October 31, 1892. On awaking two weeks ago he noticed that the right eyelids were glued together, and that there was some lachrymation. The following day his vision is troubled by the increasing secretion, and a sensation of foreign body which causes spasmodic contractions of the lids.

October 20th.—He is obliged to stay in his room; he complains of cephalalgia, chills, and some fever.

October 25th.—Severe pain in the eyeball; in the right eye the vision is considerably clouded. Photophobia.

These symptoms as well as a feverish condition continue during the past five days in spite of lotions with boracic acid solution and the application of a leech prescribed by his physician.

On the morning of the 31st the congestion has gained the left eye, and this decides the patient to consult an oculist.

The lids are swollen on both sides. The right conjunctiva is intensely and uniformly congested, and presents a slight degree of chemosis. The cornea is clouded. Its surface is roughened, and in its centre are small superficial ulcerations of a grayish color. No hypopyon. The conjunctival discharge is profuse, cloudy, and forms yellowish masses at the inner angle of the eye.

On the left the congestion is less intense, and resembles that of a medium form of conjunctivitis. There are no lesions of the cornea. The secretion is profuse, and in the inferior cul-de-sac are small fibrino-purulent flakes. The pre-auricular glands on both sides are swollen and sensitive.

The left eye is not very painful; the right is sensitive, and the least pressure causes severe pain. On this latter side, moreover, the patient complains of a constant burning and the sensation of a foreign body rolling over the eyeball.

Up to this time the patient has always enjoyed good health. He has had no urethritis in the past ten years.

Cauterizations with a 1:40 solution of nitrate of silver and lotions with boracic acid are prescribed.

November 1st.—The day following the first cauterization, the patient, feeling greatly relieved, does not come to be treated.

The second day the left eye has become very sensitive and the congestion has much increased. The corneal trouble of the right eye has slightly diminished. From this time the patient follows up his treatment regularly and with rapid amelioration. Sleep returns, pain lessens, and recovery is complete November 12th.

At this time, however, there still remains a small central speck on the right eye. One month after the beginning of the affection this speck has entirely disappeared.

Bacteriological Examination—The conjunctival discharge contains a great number of Weeks's bacilli in the midst of leucocytes. These bacilli are both intra- and extra-cellular. No other micro-organisms are to be found under the microscope. Tubes of gelatine and beef-tea inoculated with the secretion remain sterile. On 0.5 per cent. agar a few colonies of Weeks's bacillus and of the club-shaped bacillus develop, but no other microbe.

CASE IX.—H., thirty years old, is examined November 13, 1892. He is suffering from an acute double conjunctivitis with lesions of the right cornea On awaking the 7th of November he noticed that the right eyelids were slightly glued together. The next day this eye was painful. Violent pricking sensation and lachrymation. The third day the affection gained the left eye. The patient was obliged to cease work. There was photophobia, and the profuse muco-purulent secretion formed yellowish masses on the edge of the lids and at the inner angle of the eye. Complete insomnia up to the 12th of November.

Since yesterday he is slightly relieved, but the discharge is still very abundant and his photophobia is so pronounced that the patient has to be led. There is a marked tumefaction of the lids which are somewhat violet. The conjunctiva is intensely congested and has small spots of ecchymosis, but there is no chemosis properly speaking. The discharge is yellowish and very profuse. At the centre of the right cornea exists a slight infiltration without ulceration. No swelling of the pre-auricular glands. The patient has no urethritis and has never had rheumatism. The appearance of the secretion gives us the impression that this affection is an acute contagious conjunctivitis.

Lotions with boracic acid and cauterizations with a 1:40 solution of nitrate of silver are prescribed. This treatment brings about a speedy amelioration of the subjective troubles as well as of the conjunctival lesions.

Three days later the cornea has regained its normal transparency, and November 20th—that is to say, thirteen days after the beginning of the affection—the patient has completely recovered.

Bacteriological Examination.—The conjunctival secretion contains many leucocytes, some free, others grouped together in masses and separated by a fibrinous network. There are also a great number of intra- and extra-cellular bacilli. These bacilli

are slender, similar in their dimensions to those of the septicæmia of mice. They do not stain by Gram's method. There are no other microbes. Cultures on 0.5 per cent. agar, and these alone, give positive results. These cultures develop small, grayish, punctiform colonies, which, examined on slides, contain certain bacilli analogous to those in the conjunctival secretion, with some club-shaped bacilli stained by Gram's method.

Thus, from a bacteriological standpoint, we have an acute contagious conjunctivitis, complicated with lesions of the cornea that are caused by the same pathogenic agent.

Case X.—L., aged twenty-seven years, comes to the clinic September 19, 1892, for an intense conjunctivitis with lesions of both corneæ. The patient has never had any disease of the eye, and has always enjoyed good health.

On awaking September 13th the right eyelids were slightly stuck together. The 15th he felt a pricking in the eye and a sensation of foreign body, as of sand, that troubled him in his work. The 16th his left lids were glued together upon waking, and there was a profuse muco-purulent discharge from both eyes. No treatment was applied in spite of increasing pain and troubled vision.

On the 17th these phenomena were still more pronounced, and his sight was so affected that he could hardly move about. Restlessness. Insomnia.

The 18th he is somewhat relieved, but his sight is no better; and it is only the following day that he decides to come to the clinic. The eyelids are swollen and violet. There is an abundant purulent secretion, which forms yellow masses at the inner angle of the eye and on the edge of the lids. The palpebral and ocular conjunctivæ are intensely congested. In the inferior cul-de-sac are found muco-purulent filaments. There exist some white spots of diphtheritic appearance, but no veritable pseudo-membranes are to be seen. At the sclero-corneal insertion, the conjunctiva forms a slightly projecting ridge.

Both cornea have superficial ulcerations of irregular outline. In both eyes the inferior portion of the anterior chamber is occupied by a hypopyon two millimetres in height. Marked photophobia, vision troubled by the corneal lesions. Both pre-auricular glands are swollen to the size of hazel-nuts, sensitive to pressure and spontaneously painful.

Treatment.—Warm lotions with boracic acid solution, and daily cauterizations with a 1:40 solution of nitrate of silver.

Bacteriological Examination.—The conjunctival secretion taken

with a sterilized pipette from the inferior cul-de-sac is examined on slides and inoculated in beef-tea, agar, and gelatine.

On the slides are to be seen great numbers of leucocytes, containing, for the most part at least, small slender bacilli, deeply stained by carbolicized blue and decolorized by Gram's method. Some of the cells contain as many as fifteen or twenty. There are also a considerable number between the cells. On agar there develop in twenty-four hours five transparent colonies scarcely visible on the surface of the culture. These colonies are composed of small slender bacilli that do not stain by Gram's method. After several days the beef-tea presents a light powder-like deposit formed by bacilli having the same characteristics as the above. The gelatine remains sterile.

It is to be noted that, although the inoculation of the different cultures was made with a considerable quantity of conjunctival secretion, no other microbe developed. The pus taken from the ulceration of the cornea contains no other bacilli than those already found in the conjunctival discharge. The inoculation of animals with cultures of this bacillus produces no pathological phenomena.

This bacteriological examination demonstrates that our patient was suffering from a severe form of acute contagious conjunctivitis, with lesions of the cornea, both caused by the same pathogenic agent. It is impossible to impute the ulceration of the cornea to a secondary infection. It might be admitted that the hypopyon also contained the same microbe, but, as we made no paracentesis, we can not affirm it.

The first cauterizations produce a noticeable improvement. Pain ceases, the lids are less swollen, and the discharge diminishes considerably. The ulceration of the cornea shows no tendency to spread, and the hypopyon tends to diminish.

September 24th.—Very little discharge. The ulcerations are cicatrizing. No more bacilli. The hypopyon persists, but the patient is no longer troubled, except by his vision. The preauricular glands are still swollen, but are no longer painful.

During several days the patient does not return to the clinic.

October 4th we remark a small perforation in the centre of the ulceration on the right eye. The hypopyon has completely disappeared. Though diminished, it still exists in the left eye.

October 6th.—The lids are no longer glued together, and the conjunctiva is less congested. In the cornea of the right eye the perforation has left no trace. The hypopyon has disappeared on

both sides. Both corneæ have regained their normal transparency except on the points corresponding to the ulcerations, where there remains a superficial speck, slightly opaque yet very troublesome for the vision.

Cauterizations with nitrate of silver are continued up to the beginning of October. After this time atropine is prescribed.

The patient came again to the clinic in April, 1893. After the cessation of acute phenomena he consulted Dr. Darier of St. Denis, who performed a superior optical iridectomy on the right eye, but his sight remained blurred. Dr. Parinaud then performed an inferior optical iridectomy on the left eye, and after this operation the patient was able to go back to his work.

Case XI.—Mrs. R., fifty-three years old, was examined November 2, 1892. Two weeks ago the lids of the right eye were glued together upon waking, and there was severe pain. After ten days the conjunctivitis gained the left eye.

At the present time there is marked tumefaction of the eyelids, which are of a violet color. Both the palpebral and the ocular conjunctivæ are uniformly congested and of a bright red. Profuse muco-purulent secretion. On the right cornea, at a few millimetres from its circumference, are two small zones of superficial infiltration without ulceration properly speaking. No iritis, no hypopyon. On both sides the pre-auricular glands are swollen and painful.

Cauterizations with nitrate of silver produce speedy amelioration, and recovery is complete November 15th.

Bacteriological Examination.—In the leucocytes of the conjunctival discharge is found the bacillus of Weeks. This bacillus is less abundant than in the preceding cases, but is quite as distinct.

Case XII.—N., aged thirty-five years, was taken October 20, 1892, with acute conjunctivitis of the right eye. The lids were tightly glued together in the morning and there was profuse discharge. Three days later the affection gained the left eye. No treatment was applied and the above phenomena persisted. The 28th of October violent pains in right eye, photophobia, troubled vision. October 31st he comes to the clinic.

The conjunctiva of both eyes is congested. There is a profuse muco-purulent discharge that forms yellow masses at the inner angle of the eye. At the centre of the right cornea is a grayish superficial infiltration and in its midst a small erosion. No swelling of the pre-auricular glands.

The patient did not return to the clinic.

Bacteriological Examination.—The conjunctival secretion contains great numbers of leucocytes. There are many bacilli of Weeks.

CASE XIII.—Mrs. L., aged thirty-two years, was examined October 13, 1893. For the past three days she has had acute congestion of the right conjunctiva. Since yesterday she has photophobia, troubled vision, and sharp pains in the lids.

The congestion is intense and the insertion of the cornea projects slightly. The inferior cul-de-sac contains small fibrino-purulent masses. In the centre of the cornea is a grayish diffuse spot which, in oblique light, appears like a superficial infiltration of the cornea without ulceration properly speaking. No hypopyon nor lesion of the iris. No pre-auricular adenopathy.

The patient did not come again to the clinic.

Bacteriological examination.—The discharge contains many leucocytes. Weeks's bacillus is present in great numbers, both in and on the cells.

Cultures.—On 0.5 per cent. agar there develop a few colonies of Weeks's bacillus and of the club-shaped bacillus. The cultures contain no other kind of microbe.

Very interesting facts may be obtained when, in every case of acute conjunctivitis, information is sought as to the source of contagion. Thus, one is first struck by the great variability of the inflammatory reaction on different persons contaminated from the same source, and in whose affections Weeks's bacillus remains the unique cause. Another striking fact is that, in general, conjunctivitis takes on greater intensity in adults than in children. We have often seen a child infected at school and suffering from so mild a form of conjunctivitis that the parents themselves had not noticed it. This child would give the affection to his mother who would have a severe form with œdema of the lids and a profuse purulent discharge. A brother would be contaminated and present a form of medium intensity with phlyctenulæ on the conjunctiva. In other cases the reverse may be seen and a severe conjunctivitis gives rise only to a mild form.

But in regard to contagion we are convinced that special attention should be given to those prolonged cases that drag

on one or two months, and which explain in themselves how the disease persists in an endemic state.

The following case is of particular interest. An acute conjunctivitis, treated with vaseline and a solution of boracic acid, lasts three months, is transmitted to the brother and sister of the patient in a very mild form, while the parents, who are taken later on, are affected with a conjunctivitis of singular severity.

CASE XIV.—The H. family composed of five persons, all affected with acute contagious conjunctivitis.

The elder daughter, aged seven years, entered public school the beginning of October. She told her parents that among the pupils was one that had red eyes. October 16th the mother noticed that her daughter's lids were glued together upon waking, that the eye was inflamed, and that there was some discharge. The principal of the school sent the patient to an ophthalmological clinic.

The physician that examined her prescribed lotions with a solution of boracic acid and applications of vaseline. The following days there was no change for the better. The discharge was very profuse and formed thick masses on the lower eyelid. Considerable pain. Coryza two days after the beginning of the affection but which lasted a short time only.

After two weeks the congestion of the conjunctiva abated somewhat, but never to completely disappear.

From the beginning the patient had always had the lids stuck shut in the morning. This state continued until January 15, 1894, when she came to the clinic.

A brother, aged five years, was taken a month ago with a mild form of conjunctivitis which the parents did not consider of sufficient importance to have treated. The lids were glued together; very little conjunctival secretion and discharge. This condition also lasted until January 15th. There had been no coryza.

A sister, aged thirteen months, was taken January 1st with a mild conjunctivitis of the right eye which two days later gained the left. This continued until January 15th. There is the least possible congestion and the discharge is hardly noticeable. However, in the inferior cul-de-sac is seen a small fibrinous flake. The lids are glued together on waking. No treatment has been made.

The mother, aged thirty, up to that time in good health and never having had any affection of the eyes, awoke on the 10th of January with the lids on both sides glued together and the eyes intensely congested. That very evening there was severe pain. A burning and sensation of foreign body render all work impossible. Profuse discharge. The next day there was an intense coryza which lasted twenty-four hours only, while the ocular symptoms became more and more accentuated.

January 12th the patient comes to the clinic where a diagnosis is made of acute contagious conjunctivitis. The conjunctiva is deeply injected, and in the lower part, near the cornea, are extensive subconjunctival ecchymoses. Profuse discharge. In the inferior cul-de-sac are numerous fibrinous purulent flakes. No swelling of the pre-auricular glands. No lesions of the cornea.

The father, aged thirty-five, last of all, two days after his wife, was taken with an intense form of acute conjunctivitis with palpebral œdema and slight swelling of the pre-auricular glands.

Daily cauterizations with nitrate of silver produce such speedy relief in the parents that they decide to bring their children to us. The five patients are all submitted to the same treatment. After nine cauterizations all pathological phenomena disappear, and January 20th recovery is complete.

Bacteriological Examination.—We examined under the microscope the conjunctival discharge of three of these patients: the elder daughter who had suffered for three months, the five-year-old brother who had been troubled for a month, and the mother whose affection had begun only five days before. In all these cases the secretion gathered with a fine tube was rather cloudy. On slides, a variable number of leucocytes were to be seen. The mother's secretion contained some blood corpuscles. The bacillus of acute contagious conjunctivitis, whether free or included in cells, was easily recognized. In the mother's case it existed in great numbers.

Duration.

Acute contagious conjunctivitis does not generally last longer than two or three weeks. Some mild forms disappear after a few days, either spontaneously or with nitrate of silver cauterizations. Exceptionally, when there are severe complications of the cornea, the acute stage may last a month or six weeks. It must also be remembered that

an acute conjunctivitis of benign appearance, left without treatment, may linger two months and even longer, affecting the aspect of chronic conjunctivitis.

Relapses are not rare, especially when several members of the same family are infected successively. Thus the same patient may suffer from a succession of conjunctivitides. In these cases it is absolutely necessary to treat all the patients at the same time in order that there be no re-infections.

Prognosis.

As far as the vision is concerned, the prognosis is always favorable. When an acute conjunctivitis is to be severe, the symptoms are marked from the start, and if it be treated at once there is no risk of serious complications. The lesions of the cornea, of which we have given above several cases, are generally of small importance, as in most of them the transparency of the cornea is not modified. The one case of ulceration of the cornea with hypopyon that we describe shows that exceptionally acute contagious conjunctivitis may have grave consequences. Moreover, from the patients that we have examined, we believe that this affection is nearly always more benign in children than adults. In all our cases that were accompanied with lesions of the cornea the patients were adults.

Diagnosis.

In ordinary cases the diagnosis is easy, especially when the patient is a child. The slight bloating of the lids, the diffuse congestion of the conjunctiva without marked chemosis, the yellow masses at the inner angle of the eye, the cloudy appearance of the conjunctival discharge, and the few fibrino-purulent flakes found in the inferior cul-de-sac, the bilaterality of the affection,—all these signs, joined with slightly pronounced subjective troubles, make it very easy to recognize acute contagious conjunctivitis. The diagnosis is still more confirmed when it is learned that there are other cases of conjunctivitis in the school, asylum, or workshop that the patient frequents or in the house he inhabits.

It should not be confounded with pneumococcic conjunctivitis which is especially frequent at an early age but which is usually confined to one eye and may be accompanied with pseudo-membranous productions on the palpebral conjunctiva.

Phlyctenular conjunctivitis is often accompanied with an impetiginous eruption on the face. The conjunctival secretion is less abundant and the congestion less diffuse. Often there are phlyctenulæ on the cornea. Acute conjunctivitis with phlyctenulæ may sometimes be difficult to distinguish from phlyctenular conjunctivitis.

Gonorrhoic conjunctivitis with vulvo-vaginitis which is seen in young girls may be recognized by its more abundant secretion and by the etiology of the affection. It is generally confined to one eye.

In the adult the diagnosis is sometimes more difficult. A gonorrhoic origin may be wrongly invoked in some severe forms. It is true that the chemosis is never very marked, but the bloated eyelids and the profuseness of the purulent secretion sometimes point towards this diagnosis, especially if at the same time there exist lesions of the cornea.

The conjunctivitis of springtime is to be distinguished by its long duration, its reappearance every year at the same season, the special ring which develops on the edge of the cornea, the milky aspect of the conjunctiva, and the scantiness of the secretion.

We will not insist on the other varieties of conjunctivitis with which this particular form may be confounded. In the cases which have just occupied our attention the question of differential diagnosis is of practical interest and it is for this reason that we stop here.

It is of great importance to recognize acute conjunctivitis in order to warn the patient or his parents of the danger of contagion and to forbid children to attend school. Moreover for the prognosis it is necessary to make a precise diagnosis as this affection is far from having the same gravity as gonorrhoic conjunctivitis.

The clinical symptoms suffice in a certain measure for the diagnosis, but in order to be absolutely assured of the nature

of the infection, the conjunctival secretion must be examined microscopically. No doubt can remain after this examination.

Treatment.

Acute conjunctivitis must not be left to itself or treated with timidity. It is certain that some cases recover spontaneously after two or three weeks' duration; but it is also frequent to see this affection last much longer and become the cause of numerous and serious contaminations.

The best results are obtained by daily cauterizations with nitrate of silver (a 1 : 40 or 1 : 50 solution) followed by neutralization with chloride of sodium. These cauterizations should be made by the physician. The patient should apply tepid lotions of boracic acid solution which give some relief. Smoked glasses will be found useful as the photophobia is often very troublesome. Bandages are injurious.

Nitrate of silver instillations are not counter-indicated by corneal troubles. When these latter are marked it is well to add instillations of sulphate of atropine. A sulphate of zinc collyrium (1 : 40) is also useful in mild forms, but nitrate of silver is preferable and our personal experience has shown us that it does not produce sharper pain.

As for prophylaxis, it is of the greatest necessity that children suffering from acute conjunctivitis be forbidden to continue in school as long as the eyelids are glued together in the morning on waking. Parents should be warned of the contagious nature of the affection and advised to wash their hands every time they care for the child and not to use the same towels.

A CASE OF CHOROIDAL HEMORRHAGE FOLLOWING EXTRACTION. ENUCLEATION A WEEK LATER OWING TO SEVERE PAIN. REMARKS ON THE LITERATURE OF THE SUBJECT.

By Dr. J. A. SPALDING, Portland, Me.

CASES of choroidal hemorrhage after extraction of cataract with or without an iridectomy are generally supposed to be very rare, and for that reason every occurrence of this serious accident ought to be reported in the hope that by comparison of the condition of the eye before the extraction we may discover some means of prevention in the future.

The only case that I have seen in my own practice, among about three hundred recorded extractions, is as follows:

Three or four years ago I operated successfully by simple extraction on the right eye of a healthy and robust country patient of sixty-four years. The primary result was very good. Later on, the capsule shrivelled, but was divided with good result. The patient could not read, owing to defective education, but with lenses he could do his work as well as ever.

About Christmas, 1894, he consulted me for blindness of the left eye, and insisted on having extraction performed. Physically he had grown very decrepit since I had seen him two years before. The right eye was in good condition, and sight as useful as before; that is to say, after division of the capsule. The left eye exhibited a very large mature yellowish cataract. There was no abnormity in the function of the eye, perception of light was good, and field perfect, but I was inclined to think that the iris trembled as if the lens were slightly dislocated. Others having

examined the eye and failed to observe the tremulous iris, I put the idea aside as not established.

The patient being very desirous to have the cataract removed at once, and simple extraction having done so well for the other eye, I saw no reason to object, although I had an indefinable sensation that owing to possible dislocation of the lens, loss of vitreous might be met with during the extraction, or that a spoon extraction would become a part of the operation.

The eye being thoroughly sterilized, simple extraction was begun on the 10th January, 1895 : Incision entirely in the cornea, and quite large, embracing nearly a half of the circumference. After the incision was completed, the cornea collapsed as we often see in the aged. The speculum was then held wholly away from the globe by an assistant, but the lids were still kept well apart. The capsule was then divided with a T-shaped incision, and the lens gently and smoothly expelled. The speculum was then removed, whereupon the patient was observed to squeeze the lids together. Some pain, but not much, was complained of. In a minute or two some fluid vitreous exuded from between the lids. On inspecting the globe a large bead of vitreous was seen lying between the lips of the incision. Then prolapse of iris ensued. This being replaced, it again came out of the eye. In another minute there was a gush of blood.

The patient was raised in bed, and a compress bandage applied. Pain increasing, morphine was given, and bandage removed. Hemorrhage did not last long, and on the following day there was none. The globe remained painful ; in fact, in spite of sedatives the pain grew worse day by day. The clots were removed from between the incision, but came again. Finally, one week after the extraction, the patient yielded to our often repeated proposal to have enucleation done, and it was done with relief to all the symptoms, including at one time delirium.

I have sometimes thought that the patient being so very decrepit the pain was exaggerated, for repeatedly after the instillation of cocain he remarked that he felt much better, and on dressing the eye after cocain there was no complaint of pain.

The hemorrhage was macroscopically discovered to originate from the anterior portion of the choroid, directly behind the ciliary region. There was no detachment between any of the tunics of the globe. The vitreous chamber seemed to contain blood coagula and softened vitreous in about equal amount.

Owing to misunderstanding no microscopic examination was made.

It is my opinion that the hemorrhage was due to relaxation of the suspensory ligament, permitting too rapid an extraction of the lens, as a result of which the degenerated vessels in the region of the incision gave way, with the usual result. I would call attention to the fact that this case is nearly the only one which I am able to find in which successful extraction in the same patient has been followed with this accident in extraction on the second eye. For this reason it would seem probable that the marasmic condition of the patient must be held as the exciting cause.

Remarks.

This accident is supposed to be extremely rare, and many ophthalmic surgeons with whom I have conversed had never heard of but one or two cases of the sort, and they expressed surprise when I mentioned that I had discovered as many as fifty reported cases, whilst of the unreported (owing to a sense of shame, perhaps) there must be a much larger number than we have at present any idea.

It would take too much valuable space to report in the present paper all of the cases that careful study of accessible literature on cataract extractions has revealed to me, but I will add a bibliography at the end of this paper, and now simply abstract a few of the most important cases reported, especially of those in which the authors express some opinion in regard to the etiology of the accident, or concerning some means for its prevention.

Hirschberg's *Centralbl. f. Augenheilk.*, 1890, p. 538, has a review of Dr. H. Wood's paper in the *Medical Record* for May, 1890, where we read that glaucoma sometimes complicates senile cataract, when the question arises, Shall we first iridectomize, and then extract, or shall we perform both operations at the same session? The author first iridectomized and then extracted in a lady of fifty-six, and met with choroidal hemorrhage directly after, terminating in total loss of the globe. He quotes uthorities, and remarks that Wells suggests a preliminary iridectomy in such cases,

because, if there is, at the extraction, loss of vitreous, the tendency to intraocular hemorrhage would be excessive. The writer then remarks that prophylaxis is useless, as there are no premonitory symptoms. Eyes with increased tension, with adhesions, with fluid vitreous, and choroiditis are to be viewed with suspicion. If the hemorrhage ensues and there is no hope of saving the sight, enucleate at once. The author quotes Fage as advising us to wait till panophthalmitis sets in. Possibly where one eye has thus been lost, the other could be saved by compressing the carotids, as suggested by Abadie, for a day before the operation, as well as also to inject ergotine hypodermatically into the temples, and choose some other method than the flap operation. He concludes by saying that Warlomont advises discission in the second eye where the first has been lost by choroidal hemorrhage, whilst Liebreich declines to operate at all on the second eye, thinking that what sight remains in the eye with a mature cataract is better than none.

Fage, whose paper appears in the *Arch. d'Opht.*, August, 1889, saw hemorrhage after extraction in a man of fifty-nine, who made his own way to bed after the extraction without any injury. He had scarcely lain down when he complained of pain in the eye, which was followed with excessive hemorrhage and panophthalmitis, so that enucleation was soon done. The macroscopic examination showed that the hemorrhage had arisen from between the sclera and choroid, but no diseased or ruptured vessels could actually be discovered. The author thinks that we may safely wait for enucleation. If he had lost an eye in this way and was asked to extract on the other he would use ergotine treatment preliminary to the extraction, and follow with compress bandage, and the most strict immobilization of head and body before and after the operation.

This subject was discussed in 1884 at a meeting of the French Society of Ophthalmologists, at which Fieuzal spoke of a case similar to that which I have reported at the beginning of this paper. The patient, a man over sixty, had been successfully extracted in the right eye, but on performing a like operation on the left eye hemorrhage immediately

ensued and enucleation was necessary at once. This patient was free from albuminuria, atheroma, and increased tension. In the discussion, two other cases were mentioned, no prophylaxis except ergotine was suggested, and enucleation was advocated immediately, on the ground that the eye and vision being hopelessly involved there was nothing to be gained by waiting. Such an accident could not be foreseen.

Kazaurow (*Centralblatt*, 1884, p. 396) saw a similar case with abundant hemorrhage lasting an entire day, in a case of hypermature cataract. He does not suggest that the over-ripeness of the lens may have produced relaxation of the zonula, which in its turn led to the hemorrhage.

The next noteworthy case is one reported by Rydel in *Zehender's Monatsblaetter*, 1879, p. 20, in which, five days after a normal extraction, a fine stream of blood issued from the region of Schlemm's canal, and passing into the anterior chamber soon filled it totally. It is suggested that this hemorrhage originated from neoplastic vessels. Although an iridectomy had been done, as a step in the extraction, there was no hemorrhage from the iris, nor from the cornea, nor from the ciliary vessels, as they had not been injured by the incision. The eye recovered with fair vision. This case is not typical, but is quoted as offering, perhaps, some solution for the origin of the hemorrhage.

At the Heidelberg Congress in 1879 Pagenstecher spoke of cataracts beginning with spots in the lens, in people of not over forty, in which during extraction the aqueous was followed by a thin fluid, with collapse of the globe, and then by profuse hemorrhage into the anterior chamber. These eyes could often be saved from total loss.

Steinheim's case of hemorrhage (*Centralbl. f. Augenheilk.*, 1878, p. 363) recovered without panophthalmitis, and even the anterior chamber was restored, but vision was null, and after a few months the eyeball collapsed and became painful at times. The author evidently had never seen a similar case before, for he asks if there is anything to be done to prevent or to relieve a similar occurrence.

Power, in the *St. Bartholomew Hospital Reports*, xxi., p.

123, speaks of one eye out of sixty extractions lost by choroidal hemorrhage directly after the operation. He refers the accident to the nausea, dependent on chloroform, which was in those days almost exclusively used in all these operations.

In the same way H. Derby, in the *Boston Medical and Surgical Journal*, 1877, p. 491, refers the hemorrhage after extraction (without, however, stating precisely how many cases he had seen) to the nausea following the use of ether or chloroform.

Warlomont is one of the early observers of the accident under discussion, his first case being in extraction with iridectomy. The patient walked up-stairs after recovery from the narcosis, and soon became severely nauseated; hemorrhage soon followed. After removal of the globe, which was done at once, the hemorrhage was found to originate in the choroid.

The other eye of this patient was afterward operated upon by Lebrun with the same unfortunate result. Lebrun's operation, it may be remarked *passim*, was with a low downward flap with iridectomy.

Amongst other observers who think the hemorrhage due to nausea I may quote Gama Pinto (*Arch. Ophth. d. Lisboa*, v., p. 8) who saw two cases in Heidelberg in Becker's clinic. Vomiting was very violent and prolonged. One of the eyes exhibited great friability of the choroidal vessels, and the other was highly myopic.

Very recently Dufour read, at the Edinburgh Ophthalmological Congress of 1895, a paper on eight cases of choroidal hemorrhage after iridectomy and extraction. In opening his paper he remarks that v. Graefe told him that he had never seen the accident. Dufour's first case was a normal iridectomy. As he stood looking at the eye to watch if the angles of the coloboma were neatly adjusted, the incision gaped, the lens presented itself, protruded from the eye, slipped out on the cheek, and the usual hemorrhage ensued with enucleation necessitated.

The hemorrhage arises from the ciliary body chiefly. We cannot foretell it. One case was apparently relieved by the

abundant use of morphia, and some vision was saved. We should always have a hypodermatic syringe with morphia on the operation table in case of need.

The discussion brought out the fact that Gruening had seen one case of hemorrhage after extraction, and Darier another. Ayres and Power also spoke of their experiences with single cases. It is surprising that with increased tension hemorrhage is not more frequent.

It is rather difficult from the report to decide whether morphia is meant or apomorphia, but judging from the context it would seem as if the latter were the drug intended to be used from its tendency to relieve nausea, which is by most observers regarded as the cause of the hemorrhage.

A more careful reading shows that Dufour refers to *eight cases* of hemorrhage after extraction, and two after glaucoma iridectomies. It is not stated whether iridectomy was done in all of the cases of extraction or whether, as in my own, simple extraction was undertaken.

Interesting cases are reported by Mooren (*Fuenf Lustren*, 205); one of an aged man in whom extraction was followed by excruciating pain in the eye and then by emesis and that by loss of the eye from choroidal hemorrhage with total expulsion of the vitreous. And still more important we have in the same work another case in which a simple extraction in one eye having been followed by loss of the sight from choroidal hemorrhage, the other eye being submitted to the same operation with all possible precautions the same result followed. Here the arteries beat so violently that they could be seen plainly at the temples. He refers the hemorrhage to atheroma of the arteries, thinks that it verifies Michel's theory of the origin of cataract from the sclerosis of the carotids, and finally suggests that we may find similar conditions in the retinal hemorrhages occasionally seen months after successful extractions.

Edward Jackson has a paper on this topic in the *Annals of Ophthalmology and Otology*, iii., p. 9, in a woman of seventy-five; reasonable amount of vision with hazy cornea and apparent excavation of papilla. O. S. blind with good projection but a dislocated lens. Extraction of this dislo-

cated lens with a loop, and without accident, was followed in an hour with abundant hemorrhage. There was much pain in the head and eye. The hemorrhage ceased on placing the patient in an upright position with her feet out of bed. The eye shrivelled but enucleation was refused.

The author suggests that patients in whom hemorrhage is possible should be operated upon whilst sitting. He had removed three similar lenses in this position without ill results. In his opinion, the increased tension is the cause of the hemorrhage.

In the discussion following the reading of this paper, Thomas remarked that he had seen a case after extraction, or rather after making the corneal incision for an extraction and before the iridectomy. Thomson reported a similar case.

The same number of the same journal has another case by Risley, in a patient of twenty-eight, with tremulous irides. The pupil was stiff, and did not react to light and shade. The lenses were not dislocated, but they sagged downward owing to relaxation of the suspensory ligament. The operation was performed on the patient sitting, but before the capsule could be divided (no attempt at iridectomy) the patient screamed with pain in the eye and there was a gush of vitreous. The lens had to be spooned. Hemorrhage soon set in and the eye was lost. Enucleation was refused. The patient left the hospital and not long after was reported dead.

The writer suggests that the hemorrhage depended on degeneration of the eye as exhibited in the sagging of the lenses, the fluid vitreous, and the tremulous irides.

Simi's three cases are simply mentioned as occurring in marasmic patients without any visible premonitory symptoms in the eyes, and in all, the extraction was without iridectomy, which goes to show that injury of the iris has apparently no connection with hemorrhage after extraction. *Boll. d'Oculist.*, x., p. 153. He advises preliminary iridectomy in second eye, when first eye has been destroyed by choroidal hemorrhage.

De Schweinitz, in the *Annals of Ophthalmology and Otol-*

ogy, iii., p. 12, had a patient, a woman of sixty-five, with but one useful eye. In order to give her all the chances of a successful operation he performed a preliminary iridectomy. A month later, after finishing the corneal incision, a bead of vitreous appeared, and the lens was immediately removed with the spoon. Further loss of vitreous. Vision was satisfactory, and bandage applied. Suddenly the patient complained of severe pain in the eye, and of nausea. Anticipating hemorrhage, a hypodermatic injection of morphia was given, and the patient placed in a sitting position. But all was of no avail: the eye collapsed with choroidal hemorrhage and remained blind.

This author quotes from Trousseau to the effect that in 234 extractions he had seen but one eye lost by this accident.

Galezowsky is also quoted as having seen but one case in over 1900 simple extractions, and thinks the freedom from accidents by this method is owing to the fact that atheromatous vessels in the iris near the ciliary ligament are not opened in simple extraction. This argument is refuted by de Schweinitz who shows that in his case the vessels in question were not injured.

The only accessible histological account of the condition of the eye after choroidal hemorrhage following extraction may be found in *Nagel*, xx., p. 310, and the *Archives d' Ophtalmologie*, viii., p. 351.

The patient under Fage's observation, a man of fifty-eight, in good bodily health with the right eye in good condition and without tension, was extracted by v. Graefe's method. Cocain anæsthesia. Iris fell before the knife, for which reason the knife was withdrawn and the aqueous allowed to accumulate. In a short time the operation was performed without accident, and after testing the sight, which was excellent, the bandages were applied and the patient walked to his bed. He had scarcely lain down when pain in his eyes was complained of. Later, the bandages soaked with blood and the eye was enucleated on the twelfth day.

On opening the eye the blood was found to have origi-

nated from the anterior portion of the choroid. Retina and ciliary body detached. Choroid detached from sclera, but under the microscope no abnormity in the vessels.

The reviewer of this paper regrets that no light is thrown on the etiology of the accident. Most authorities regard the eye as lost, but Armaignac in the *Rev. Clin. d'Oculistique du Sud-Ouest*, 1884, is quoted as reporting three cases of hemorrhage in which the eye was not only preserved but a slight amount of useful vision. In the discussion Badel said that he should always try an operation on the second eye in cases in which the first had been lost by this accident but that he should endeavor to prevent it by compression of the carotids and injections of ergotine as suggested by Abadie.

Hileman (ARCHIVES OF OPHTHALMOLOGY, xvii., p. 3) in speaking of a case of this sort thinks that it may be due to rheumatic sclerosis of the choroidal vessels.

Baldwin's case (ARCHIVES OF OPHTHALMOLOGY, xviii, p. 328) is referred to hemorrhage from the iris due to an iridectomy necessitated by prolapse in a case of simple extraction in a negress.

At a meeting of the New York Ophthalmological Society in 1890 Knapp said that he had never seen a case in the practice of any surgeon nor in his own, but soon after he had a case, an account of which can be found in these ARCHIVES, xx., p. 78. The patient had a Morgagnian cataract. She was aged and decrepit. Tension was plus, even after thorough cocainization. Simple extraction was done without accident, but in a short time a bead of vitreous appeared and then a small prolapse of vitreous, which had to be snipped off as it would not remain in place after being several times replaced. The eye was finally bandaged, the incision appearing normal and the angles of the coloboma clean. Half an hour later the bandages were bloody. The eye presented the usual aspect. Panophthalmitis did not set in, and the eye was saved, but without vision.

Knapp thinks that the hemorrhage came from the anterior portion of the choroid.

Lopez of Havana reports interesting cases of iridectomy for glaucoma, followed by protrusion of the lens, and abun-

dant hemorrhage. In one case, 150 grammes of blood were lost.

In conclusion it would seem that hemorrhage from the choroid after extraction, and occasionally after iridectomy, is by no means so rare a complication as one would think. Numerous cases have been reported, and there can hardly be a doubt that many remain unpublished in the dread of publishing what may seem to be due to a badly performed operation. But when we read the names of the surgeons to whom the accident has occurred it is plain that the misfortune is due solely to a diathesis of the patient. This being once established we shall probably hear in the future of many more interesting cases of the sort. The chief cause is undoubtedly atheromatous condition of the vessels and an abnormal tension of the eyeball suddenly reduced by the incision in the cornea and the outflow of aqueous. When it occurs the best treatment is to raise the patient's head; to relieve the pain; and to watch the eye carefully prepared to perform enucleation at the soonest possible moment. Where the accident has occurred in one eye it is likely to occur in the other, and pressure on the carotids and ergotine are indicated.[1] It does not appear that extraction with iridectomy is more frequently followed by choroidal hemorrhage than simple extraction. The accident cannot be foreseen, but may be looked for with increased tension; also in the decrepit and in those advanced in years, as shown by the case reported in opening this paper, which I regret to have extended to so unexpected a length.

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ALBRAND, *Nagel's Jahresbericht*, xxiv., 292, and *Archv. f. Augenheilkunde*. Two cases from Schoeler's clinic out of 232 extractions. These were in iridectomized extractions. One eye was excessively myopic. The other case was one of black cataract.

[1] In 1895, I had to operate on the second eye of a man whose first eye, operated on by a most skillful oculist had been lost by intraocular hemorrhage, immediately following extraction. In the second eye a preliminary iridectomy had been made; the lens was removed six weeks later, *i.e.*, seven weeks after the extraction on the other. The extraction on the second eye, done without extra precaution, was without accident and the recovery undisturbed.—H. K.

A paper read before the Ophthalmological Section of the American Medical Association in 1890. The author is not named in literature accessible to me. Compare *Ophthalmic Review*, 1890, 237.

ARMAIGNAC, *Rev. Clin. d'Oculistique du Sud-Ouest*, 1884, 154. Three cases. The author speaks of recovery after choroidal hemorrhage, but paracentesis being mentioned it would seem as if the hemorrhage were into the anterior chamber.

BADAL, *Archives d'Ophtalmologie*, July, 1889. Also *Centralblatt*, 1889, 407. One case.

BALDWIN, these ARCHIVES, xviii., 328. One case.

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BERRY, *Ophthal. Rev.*, 1891, 95. One case ascribed to vomiting after chloroform narcosis. See also *Nagel*, xxii., 299.

CASTORINI, *Gaz. des Hôpitaux*, 1874, 1926, and *Nagel*, v., 486. One case.

COGGIN, *Boston Med. and Surg. Journal*, Dec. 26, 1895. One case. Ether narcosis; iridectomy; vomiting during afternoon of same day, and eye lost from choroidal hemorrhage. Later there was a good anterior chamber, closed pupil, good projection. Globe not atrophic. No restoration of vision.

CUIGNET, *Rec.d'Ophtal.*, 1884, 533. One case.

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DIANOUX, *Soc. Franç. d'Ophtal.*, 1884, and *Centralblatt*, 1884, 111. One case.

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FANO, *Journal des Sciences Médicales*, Sept., 1886. Some cases but the number not stated in *Nagel*.

FIEUZAL, *Soc. Franç. d'Ophtalmologie*, 1884, and *Centralblatt*, 1884, 111. One patient in whom one eye had been successfully extracted, but the other eye, as in my case, was lost by choroidal hemorrhage.

FIEUZAL, *Clinique des Quinze-Vingts*, 1886, 145. A few cases, but the number inaccessible to me.

FRYER, *American Journal of Ophthal.*, Feb., 1888. Two cases.

GAMA PINTO, *Rev. Gén. d'Ophtal.*, 1884, 97. Two cases.

GASPARINI, *Annal. di Ottalmologia*, 1894. Loss of both eyes. Choroidal hemorrhage occurring to both eyes after extraction. One eye operated on two months before the other. *The first operated eye is stated to have obtained, despite the accident, vision of* $\frac{9}{10}$ *the only case on record if accurately observed.* The author emphasizes this wonderful result, and argues therefrom that we should not be in too great a haste to enucleate after the hemorrhage.

The same author mentions another case elsewhere, making thus three cases in which the hemorrhage occurred under his observation.

GAYET, *Nagel*, xix., 305. One case.

GIRARD, *Rev. Trimest. d'Ophtal. Pratique*, Oct., 1885, and *Nagel*, xvi., 437, and these ARCHIVES. Two cases.

GOTTI, *Rev. Clinique d'Ophtal.*, 1884, No. 5, and *Centralblatt*, 1884, 653. One case.

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JACKSON, *Annals of Ophthal. and Otol.*, iii., 9. One case.

KAZAUROW, *Centralblatt*, 1884, 396. One case.

KNAPP, these ARCHIVES, xx., 78. One case.

LEE, *The Practitioner*, June, 1895. One case. Preliminary iridectomy. Extraction three weeks later.

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LOPEZ, *Articulos di Medicina* Brochure in Spanish, Havana, 1895, 189. Two cases.

Massachusetts Eye and Ear Infirmary Reports, 1873. One case in forty-six extractions.

MCKEOWN, *British Med. Journ.*, Feb., 1889, *Nagel*, xx., 307. One case in forty-eight extractions.

MOOREN, *Fuenf Lustren*. Three cases.

NOYES, H. D., *Transactions of American Ophthal. Soc.* 1895. Five cases in four patients. One patient lost both eyes, and three lost one eye each. One patient finally regained some sight after the eye had been repeatedly operated upon. The author does not think well of iridectomy in extractions, owing to the tendency of hemorrhage. It may be remarked that where iridectomy seems essential, the hemorrhage can be much reduced by irrigating the anterior chamber with cocain after making the corneal incision, allowing the cocain three or four minutes to make its benumbing action felt on the anterior surface of the iris.

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PINHIERO, *Arch. Oph. di Lisboa*, 1886, 4. One case.

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PROUDFOOT, *Am. Jour. of Ophthal.*, 1888, 306. One case. *The hemorrhage was proved to have arisen from a branch of the central retinal artery. Nagel*, xix., 306.

RYDEL, *Zehender's Monaetsblaetter*, 1879, 90, *Nagel*, x., 342. One case.

RISLEY, *Annals of Ophthal. and Otol.*, iii., 16. One case.

SALAMÉ. *Rec. Gén. d'Ophtal.*, 1884, 233. One case.

SÉDAN, *Rev. Clinique d'Oculistique*, 1883, 177. One case. The same surgeon has, I think, published a second case at present inaccessible to me.

SIMI, *Nagel*, xx., 319, and *Boll. d'Oculistica*, 1888, two cases; and *Boll d'Oculistica*, 1889, two more. He advises preliminary iridectomy for the operation on second eye where the first eye has been lost by choroidal hemorrhage.

STEINHEIM, *Centralblatt*, 1878, March, and *Nagel*, ix., 363. One case.

THOMAS, *Annals of Ophthal. and Otol.*, iii., 12. One case.

THOMPSON, *Ibid.* One case.

TROUSSEAU, *Bulletin de Quinze-Vingts*, 1894. In 234 cases of cataract extractions saw one case of choroidal hemorrhage.

VAN DUYSE, *Annales d'Oculistique*, cv., 112, and *Nagel*, xxii., 298. Four cases, two each in the practice of Bribosia and Coppez.

WALKOW, *Wjest. Ophth.*, July, 1884, and these ARCHIVES, xxiv., 289, saw in 303 extractions two cases of hemorrhage.

WARLOMONT, *Annales d'Oculistique*, August, 1883. *Both eyes in the same patient in succession.* Interval of several months between the operations. No ether or chloroform narcosis at either operation. See also *Centralblatt*, 1883, 379.

WARLOMONT, *Nagel*, xiv., 516. One case which seems to be entirely different from the one above quoted.

WILLIAMS, *St. Louis Med. and Surg. Jour.*, liv., part 2, 106. One case.

WOODS, *Medical Record*, xxxvii., 113. One case.

Cases by AYRES, DARIER, and GRUENING, one each, in papers inaccessible.

PARTIAL DETACHMENT OF THE INFERO-NASAL ARTERY OF THE RETINA.

By JOHN DUNN, M.D., Richmond, Virginia.

(*With two figures in the text.*)

FROM July until October, 1893, Miss B., aged forty-three, was under the care of Dr. Landolt, of Paris, for trouble with her right eye. A letter given Miss B. at this time by her oculist states that the trouble was exudative choroiditis. When this inflammation was at its worst the V. O. D. was only $\frac{1}{100}$. The exudate was gradually absorbed and the vision rose, with correcting glasses, to $\frac{1}{15}$. Dr. Landolt, in this letter, says: "One large white spot, occupying the lower inferior part of the eye, will probably always remain as a trace of the severe inflammation which the eye has undergone."

During the last week in September, 1895, Miss B. noticed numerous muscæ volitantes with her right eye. On October 1st I examined the eye and found the following condition:

With the pupil dilated and the eye turned downwards and slightly inwards, if the vitreous was examined with the ophthalmoscope through + 8 D sph. (this eye has − 1¼ D sph. − ¾ D cyl. ax. 90° as its refraction), there will be seen in the vitreous a stationary, highly refracting, irregularly shaped, translucent, whitish spot. This may be the remains of an exudate occurring at the time of the choroiditis, and the "large white spot" referred to by Dr. Landolt. As this spot is being examined with a + 8 D sph. lens, a faint shadow is seen between it and the fundus. If the + 8 D sph. now be changed to a + 5 D sph. this shadow will be

plainly seen to be a second "white spot" similar to the first. *This second spot is also stationary, but is attached to and partially surrounds the summit of a curve in the infero-nasal retinal artery, which at this point does not lie in the retina, but is bent forward into the vitreous.* Changing gradually the lenses in the ophthalmoscope from + 5 D sph. to − 3 D sph. this artery can be followed downwards and outwards through the vitreous to where it enters the retina at a distance from the disc equal to about one diameter, and perhaps a little more, of the optic disc. From this point it lies in the retina until it reaches the disc and joins the central artery. Followed downwards and inwards from its summit in the same manner the infero-nasal artery descends through the vitreous to the retina, into which it enters and in which it can be followed for a short distance. Just at this point of entry into the retina it is surrounded by a whitish spot, similar in character to the two above mentioned as seen in the vitreous.

These whitish spots are probably remains of the exudate and fibrinous in character. The last-mentioned one has probably served to bind the artery down to the retina and to prevent its further detachment.

The whitish light streak, broken, however, at minute intervals, can be seen throughout the detached part of the infero-nasal artery. This artery is normal in size; that the lumen is still pervious is proved by the fact that with each beat of the pulse the artery can be seen to pulsate, the wave-like motion given to the vessel by the blood passing through it being beautifully distinct. The fundus of this eye shows for more than the whole of its inner half a marked thinning of the retina, the choroidal vessels being everywhere visible. The only deposits to be noticed are a few minute white ones in the neighborhood of the macula; two or three whitish, but not very pronounced, ones along the infero-nasal artery where it leaves the retina near the nerve, and the more distinct deposit, above mentioned, which surrounds this artery where it, after its course in the vitreous, again enters the retina. *There is nowhere any detachment of the retina itself.*

The infero-nasal artery in most normal eyes runs for some distance in the retina without giving off any branches. It then, in a varying proportion of cases, gives off two small

ones, one above and one below; after which it again runs a considerable distance before finally subdividing.

The deposit in the vitreous above mentioned as surrounding the infero-nasal artery at the summit of the detached portion is about the same distance from the optic disc as that at which this artery at times gives off its first two small branches. This deposit appears to be about *2 mm* in breadth and may be compared to a head attached to the artery by a small neck, which as a film surrounds the artery. The point at which the infero-nasal artery, after its course through the vitreous, enters the retina is about one disc's distance from the limit of the field of examination, as revealed by the ophthalmoscope. It will thus be seen that the infero-nasal artery is detached for more than half its length.

The vitreous is apparently normal in consistency. I judge this from the facts that the detached portion of the infero-nasal artery is at rest during the intervals between the pulse-beats; and that no motion is given to it by movements of the eye. And, too, the detached portion of the infero-nasal artery shows none of those irregular movements to be seen in cases of persistent hyaline artery, where the vitreous is more or less fluid. There are no floating bodies in the vitreous; even the "large spot" referred to by Dr. Landolt being stationary.

This case then, it seems to me, must be considered as one where as the result of the absorption following an exudative choroiditis (chorio-retinitis?) a partial detachment of the infero-nasal artery of the retina has taken place; the motion communicated to the artery by the passage of the blood through it being sufficient to cause this detachment of the artery when its moorings, so to speak, had been weakened, or more probably, this portion of the artery was pushed out of the retina by the choroidal exudate. That this condition did not exist in October, 1893, it is fair to presume from the fact that it is not mentioned in the long report made of this case by Dr. Landolt and his assistant, both of whom repeatedly examined the eye at that time, and from whose report I have above given an extract. The present conditions of the eye, when taken in connection with the history of its inflammation, do not allow us to consider this detachment as a congenital anomaly. The curve of the detached

portion of the infero-nasal artery may be thus represented. (*vid.* Fig. 1). It will be seen that there is a double curve in the detached portion of the artery.

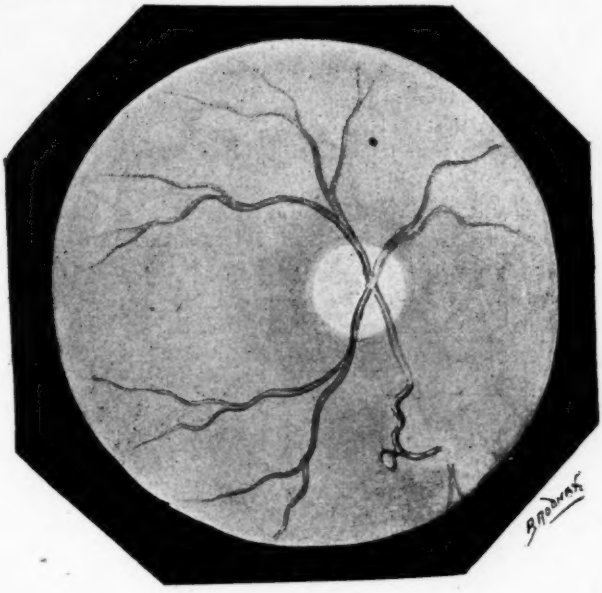

FIG. 1.

In Fig. 1 only the retinal arteries have been represented; the veins have been omitted. No attempt has been made to depict the changes in the choroid or the thinning of the retina.

FIG. 2.

Fig. 2 shows the inferior nasal temporal artery at the place of detachment.

Examination of the fundus failed to reveal any condition which might be said, for certain, to be the bed from which the artery was detached. The loss of the retinal pigment

and numbers of choroidal vessels visible, however, might account for this. The vitreous between the summit of the detached portion of the artery and the retina can be easily examined and is free from deposit.

In regard to the condition of the eye which caused Miss B. to consult me, the symptoms of which were slight impairment of vision and the appearance of numerous moving "spider-legs" before the eye, I shall only add that there was a slight œdema about the macula, which under treatment diminished in a few days and with it the muscæ volitantes became less noticeable. After the instillation of atropia Miss B., when in a bright light, became conscious of the pulsations in the detached portions of the artery. These showed themselves by the appearance in the upper and outer part of the field of vision of a faint shadow with regular movements.

P. S.—Since the above case was described the following further example of partial detachment of the retinal vessels has come under my observation:

James H., aged fifty-nine, has a detachment of the retina O S, which has existed two months. Nearly the whole of the inferior half of the retina is detached, and the detached portion has so much motion that when the eye is turned down and a little outwards it floats almost to a horizontal position. As the superjacent vitreous is transparent the wavy surface of the detachment can, with the aid of appropriate lenses, be distinctly seen from just posterior to the inferior border of the lens the whole way to the optic disc. The course of the retinal vessels can be distinctly followed. In places they can be seen to lie in the trough of a wave, to ascend to the crest, and descend on the other side. In places the vessels can be seen to lie in the retina; in other places they are raised above the retinal surface to which they are attached; tissue which shows as a white streak extending between the inferior aspect of the artery and the retina shows that these vessels are not free. *In other places the vessels have torn themselves for a short section of their length entirely free from the retinal tissue and can be seen to bend upward into the vitreous, forming curves, both ends of which lie in the retina.* Shortly after the inferior temporal

retinal artery divides, both branches leave the retinal tissue, arch upwards into the vitreous, and then descend again into the retina. Owing to the position of the small arches thus formed and to the fact that they are in planes, but slightly divergent, a clear side-view of these arterial arches can be obtained.

This case has been mentioned inasmuch as it shows that where the retina has been detached from the choroid the retinal arteries may for a greater or less extent of their length become separated from the retina. This case suggests the explanation that in the case of Miss B. there may have been a partial detachment of the retina at the time of the chorio-retinitis, and that this accounted for the partial detachment of the inferior nasal retinal artery. If so, there must have been a re-attachment of the retina, while, as a matter of course, the detached portion of the artery could not return to its place.

APHAKIA—CYLINDRICAL FORMATION IN THE VITREOUS—COLOBOMA OF THE OPIC DISC. A CONTRIBUTION TO THE CONGENITAL ANOMALIES OF THE EYE.

By JOHN DUNN, M.D., Richmond, Va.

(*With two figures in the text.*)

Examination of the left eye of Miss M., aged thirty-nine, reveals the following anomalous condition. There is internal strabismus, and while the patient is able to move the eyeball, its motions are restricted, and with the right eye closed the patient has no control over the movements of the left eye, in which V = o. Patient says she has never been able to perceive light with the left eye. The anterior chamber is centrally very deep, and suggests at once absence of the lens, and examination proves the eye to be aphakic.

The iris is tremulous. The pupil is about 2 *mm* in diameter, centrally situated, and dilates but slightly under repeated instillations of atropia. *The pupillary reflexes exist, however, for both direct and indirect light stimuli.* The iris, although discolored, being of a dirty yellow hue, while the iris O D is a clear yellow-gray, shows no evidences of the existence of posterior adhesions.

The vitreous is normal in degree of transparency. Extending, however, through the vitreous from the region of the upper and inner posterior aspect of the iris to the situation of the optic disc is a body giving the appearance shown in Fig. 3. This body has three distinct parts, a head, a long, movable, cylindrical neck, and a base. The head, which I should judge to be about 3 *mm* in diameter by 1½ *mm* thick, can be distinctly seen. It has the appearance sometimes presented by the shrivelled capsule of a lens, where discission has been done in early youth. Its outline, how-

ever, is more regular. In this head there is a whitish appearance highly suggestive of the so-called chalky deposits in the lens. The iris does not rest directly upon this head, which I should judge to be behind what is the posterior chamber in the normal eye. Posteriorly the head is drawn out into a cylindrical neck, which is about 1 or 1½ *mm* in diameter, and extends in a sinuous manner through the inner half of the vitreous to the place where in the normal eye exists the optic disc. This neck with every

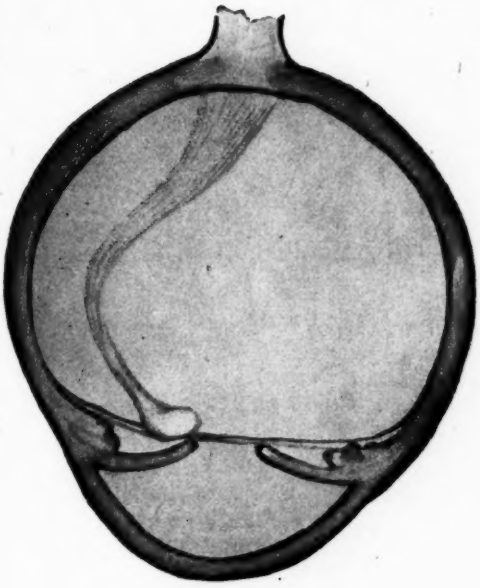

FIG. 3.

movement of the eye floats about in the vitreous, which must be of less than normal consistency. The irregular movements of the neck resemble those which might be executed by a worm, and at first glance the head and neck suggested the possibility of a cysticercus. A second glance, however, corrected this impression. The neck is of a cloudy gray appearance, and, examining it under a highly magnifying lens, I repeatedly thought I could detect minute threads projecting from it into the vitreous. These thread-like projections were, however, so minute and so trans-

parent that I could not accurately determine their existence. There is no blood-vessel extending along this neck (the hyaloid artery has disappeared). The appearance of the neck then and its movements are greatly different from the regular wave-like motion seen in the detached portion of the retinal artery where the vitreous is normal (*vid.* the preceding case described in this number of the ARCH. OF OPHTH., vol. XXV., p. 106).

When the neck reaches the vicinity of the optic disc it broadens out into a cone-shaped base. The tissue composing the base, while of cloudy gray color, resembling that in the neck, is much

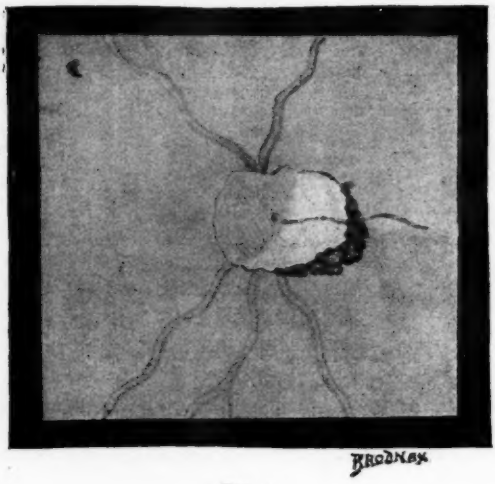

FIG. 4.

less dense, yet is not transparent enough to allow a view of the fundus where it is attached.

The fundus is normal so far as the appearance of the retinal tissue is concerned. The choroidal vessels are not visible. Where there should be an optic disc is a large, irregularly quadrilateral coloboma. It is the upper and inner corner of this coloboma from which the base of above-described body springs. About the lower and outer edges of this coloboma there is considerable massing of the retinal pigment. The general appearance of the coloboma is a bluish gray, such as we sometimes see in old cases of optic atrophy. The coloboma extends farther to the

outer side and below the proper place for the disc, than it does to the inner and upper side. Properly speaking there is no disc visible in this case.

The retinal vessels are few in number and small in size. (In Fig. 4 where the artist has attempted to give a drawing of the coloboma the vessels are represented too large.) They make their appearance below and above from the edge of the coloboma and come from beneath the base of the remains of the central canal. One small vessel can be seen to extend from the base centrally across the coloboma. The movements of the eye rendered it impossible for me to decide whether or not a macula existed.

Fig. 4 gives some idea of the shape of the coloboma, whose length is about 3 Od and whose breadth about 2 Od. In Fig. 4 the shaded area represents the part of the coloboma which cannot be viewed by the ophthalmoscope because it is occupied by the base of the cylindrical body above described. O D shows nothing worthy of remark.

The unusual features of this case are the absence of the lens, and the position of attachment of the head of the cylindrical body. The remains of the central canal, the conical base and its point of attachment, the malformation of the papilla, and the existence of the coloboma point to the congenital nature of the defect. It is to be noted that light reflexes exist in O S, in which there has never been perception of light.

A CASE OF A CAVERNOUS ANGIOMA IN THE DEPTH OF THE ORBIT, REMOVED WITH PRESERVATION OF THE EYE.

By HERMAN KNAPP.

(*With six drawings.*)

PSEUDOPLASMS, producing exophthalmus and other more or less important symptoms, are not always easy to determine in their nature and location. That in cases of doubt exploratory operations, with a determination to preserve a useful eye without deflection and diplopia, are legitimate and may prove highly gratifying, will be illustrated by the subjoined case. Benign tumors causing exophthalmus have been removed from the depth of the orbit with preservation of the eye years ago, but the number of such cases is not great, nor are examples infrequent where the operation proved the surgeon's mistake in his supposition that the tumor could not be extirpated without first removing the eye. This refers with particular force to the cavernomas in the depth of the orbit; witness the first well described case, by A. v. Gräfe in 1860, and several others reported later. These experiences suggest the rule, not to sacrifice the eye at once when the diagnosis is doubtful, but to begin the operation in an explorative way, stop when it proves useless or dangerous, and convert it into a radical one as soon as the necessity is recognized, sacrificing the eyeball only when it is found to be an insurmountable obstacle to the thorough removal of the pseudoplasm.

The case is as follows:

History.—C. S. Ashley, American, thirty-nine years old, farmer

of Old Chatham, N. Y., was brought to me November 19, 1895, by my friend and former pupil, Dr. Geo. Munson, of Albany. He had consulted Dr. M. twelve years previously, complaining that one day after being overheated he noticed the sight in the right eye impaired. Dr. Munson found the eye normal externally and with plus 3. D, V = $\frac{20}{30}$; in the left eye $\frac{20}{20}$, H = 1. D; no ophthalmoscopic abnormity. There was no notable disturbance until five years ago when the eye was protruding straight forward with a slight deflection outward and downward. Since then the displacement gradually increased without pain or inflammation, but with gradual failure of sight.

Present Condition.—On examination we found V R. eye with + 3.5 D $\frac{1}{200}$, L. $\frac{20}{20}$, with or without + 1.D. Field for white ball normal. Right eye protrudes about 10 *mm* beyond plane of left. Mobility of right eye normal in every direction. Binocular fixation kept up to six inches, within which distance the right eye diverged. Pressure on the eye was neither painful, nor did it reduce the exophthalmus. Auscultation was omitted. External appearance of eye, lids, and conjunctiva normal. Patient mentions no bruit, nor any change in position of eye in stooping. On palpation the tendon of the superior oblique is felt as a cord stretched horizontally from the pulley to its insertion. Pressing deeper around the eyeball into the orbit, an indistinct resistance, as from the anterior end of a fleshy tumor, is felt in the inner-upper part of the orbit. Deeper pressure, which gave the patient pain, was abandoned, but was to be tried when the patient was anæsthetized. There was a relative central scotoma, about 10 degrees in every direction, with somewhat anomalous color perception. The other eye normal. Ophthalmoscopically the plane of Od. showed H. 1 D.; the macula H. 3.5 D. Od and surrounding retina opaque, arteries normal, but veins enlarged and dark.

Diagnosis.—The protrusion of the eyeball almost straight forward, the mobility checked in no direction, the painlessness, the slow development, the neuro-retinitis, and the considerable impairment of sight, made us suppose the presence of a tumor of the optic nerve, or of another tumor, likewise within the muscle funnel, pressing on or involving the nerve. There being no contraction of the visual field and sight being tolerably good in spite of marked neuro-retinitis, I undertook the operation with the intention of sparing not only the eyeball but also the optic nerve if the tumor should not originate in the latter.

Operation. Nov. 25, 1895, in the operating room of the N. Y. Ophthalmic and Aural Institute.—Ether narcosis, under which now a small portion of the tumor could be distinctly felt with the finger at the inner-upper corner of the orbit, about at a level with the posterior surface of the globe. Conjunctiva was incised vertically along and beyond the insertion of the tendon of the internal rectus. The conjunctiva was loosened from the sclerotic against the cornea. The tendon of the internal rectus was put upon the hook and detached from the sclerotic. A suture was then passed through the upper and another through the lower border of the muscle and tied with the needles left on the threads, in order to stitch the muscle forward when the tumor was out. With a pair of curved scissors I now penetrated deeper into the orbit along the denuded sclerotic. After a certain quantity of orbital fat which blocked the way had been removed the tumor could be felt and seen as a hardish, blue, smooth, round mass protruding from the axis of the orbit directly behind the eyeball toward the upper part of the inner wall of the orbit. The lips of the wound were held apart with retractors, and the tendon of the superior oblique muscle, which had been exposed, was thrown out of the way with a squint hook. The tumor was dissected from its surroundings with curved scissors. In the progress of the dissection a curved hand chisel, sharp at the end and the rounded-off corners, was cautiously swung around the posterior portion of the tumor to separate the latter gently from its surroundings, especially inward, where it was united by loose connective tissue with the sheath of the optic nerve. This done, I pried with the curved chisel the tumor out uninjured. The bleeding during the whole operation was so insignificant that neither compression nor ligation was needed. In order to see whether the field was clear, I explored the wound with my finger. Finding it all right I drew the optic nerve forward with a small squint hook and was much gratified to see it uninjured and normal. The wound was cleansed with small pieces of aseptic corrosive sublimate gauze. When the hemorrhage had completely stopped, the tendon of the internal rectus was stitched forward as in an ordinary case of advancement, producing a convergence of a line or two. For a considerable portion of the visual field the patient had binocular fixation and no diplopia. Pupillary reaction normal, media clear, counted fingers readily with the eye operated upon.

Subsequent Course.

Nov. 26th.—Lids slightly swollen, cornea clear, counts fingers.

—*27th.*—Occasional pain in eye and head. Lids more swollen. Chemosis. No discharge. Neuro-retinitis the same as before the operation. Venous congestion less. No diplopia. Movements of eye diminished, owing to pain upon making the effort.

—*28th.*—Lids less swollen, cornea clear, venous congestion less marked. The two middle ones of the four advancement sutures removed.

Dec. 1st.—Congestion of background less, patient feels more comfortable, counts fingers at five feet. External swelling rapidly subsiding; the other sutures removed.

—*4th.*—Patient steadily improving, counts fingers from eight to ten feet.

—*8th.*—Eye almost in its normal position, binocular fixation, movements perfect. R V $\frac{15}{200}$; with + 6. D $\frac{20}{200}$. Field normal. L V $\frac{20}{30}$; with + 1. D $\frac{20}{20}$.

—*9th.*—Discharged cured.

Feb. 19, 1896.—In reply to my query the patient writes me: "The position of my eye is slightly turned in, but hardly noticeable. The movement is about perfect with the other eye. Compared with the other, the eye in looks is a little farther back, and the lid droops slightly. The sight has not improved to any extent. I have had no pain in either eye or head, and have been using my eyes as before the operation."

Description of the Tumor *(see plate, p. 121).*

The tumor was elliptical in shape and measured, immediately after it was removed, 37 *mm* in length, 24 *mm* in width, and 16 *mm* in thickness, the posterior end not much smaller than the anterior. It was bluish in color, surrounded almost evenly by a dense capsule. It was placed in formol and cut transversely two days later. The cut surface represented a typical specimen of erectile tissue (Fig. 1). From the capsule, which was on an average 1 *mm* thick, fibrous trabecles started and were regularly distributed through the whole breadth of the tumor, thus constituting a coarse network the meshes of which were filled with dark-red blood. With the naked eye or a hand magnifier the regularity of the

coarser structure could be well discerned. The walls varied between 0.2 and 1.5 *mm* in breadth, the same as the cavities enclosed by them. More strongly magnified, these primary cavities were seen divided and subdivided by delicate septa, starting from the walls of the trabecles, into numerous microscopic spaces. The partition walls were fibrous, consisting of fibres and cells of connective tissue, against which the blood corpuscles were crowded, apparently without the interposition of endothelium. Yet I would not allege the absence of an endothelial lining, though the latter was nowhere distinct (see Fig. 2). Under larger magnifying powers, however, and after staining with hematoxylin, the nuclei in the connective tissue and at the border of the alveoli came out very clearly (see Fig. 3). In many places the walls of the cavities were lined with rows of large hyalin bodies (see Fig. 4), which, in some sections, were also seen filling the whole alveolus (see Fig. 5).

Explanation of the Figures on Accompanying Plate.

FIG. 1.—Natural size. Cross-section of the tumor, showing the relation of fibrous frame-work and the blood cavities which they enclose.

FIG. 2.—× 50. Alveolar arrangement of the erectile tissue of the tumor; the walls of fibrous tissue, the cavities filled with blood.

FIGS. 3, 4, and 5.—Hematoxylin staining.

FIG. 3.—× 850. Oil immersion. The structure of the partition walls, especially the nuclei in the fibrous tissue and of the borders of the alveoli, as well as the formation of the smaller blood cavities more distinctly brought out.

FIG. 4.— × 850. Hyalin bodies at the walls of the cavities.

FIG. 5.— × 500. Hyalin bodies filling a whole alveolus.

The figures are drawn by Dr. Ad. O. Pfingst, resident assistant surgeon to the N. Y. Ophthalmic and Aural Institute, from specimens made by himself.

REMARKS.

The encapsuled cavernous angioma in the apex of the orbit is, as far as my personal experience goes, a rare affec-

FIG. 2.

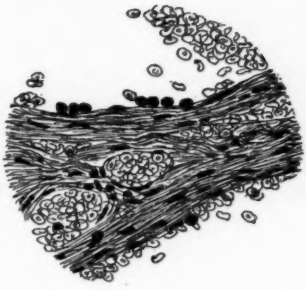

FIG. 3.

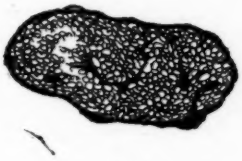

FIG. 1.

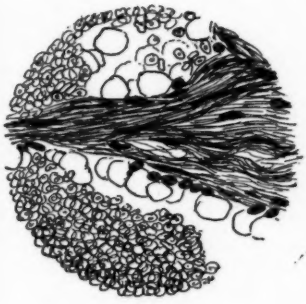

FIG. 4.

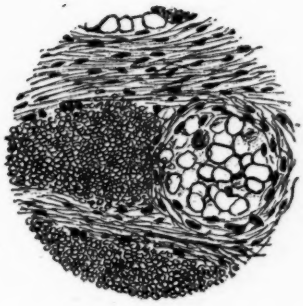

FIG. 5.

tion. This is the only case which in a practice of thirty-five years has been operated on by myself. Judging from literature the rarity of this form of growth does not seem so great, for BERLIN, in Graefe-Saemisch's *Handbuch*, vol. vi., p. 696, 1880, gives the bibliography of fifty-four cases, to which PANAS in his text-book, vol. ii., p. 422, 1894, adds twenty-one others. A goodly number of these cases do not stand criticism as to diagnosis. Berlin distinguishes the simple from the cavernous angioma, but besides the latter kind, of which our case presents a classical specimen, there are found in literature many examples of the former, namely, a variety of teleangiectatic and other ill-defined vascular hyperplasias, which are not rare in the lids and anterior portions of the orbit. They frequently represent circumscribed tumors, sometimes provided with a thin capsule, and can easily be excised as a whole and without loss of blood when a proper lid clamp is used. They swell during crying and stooping, and can readily be compressed. The clinical features of the deep-seated cavernoma, first described by A. v. Graefe in his *Arch.*, vol. vii., part 2, page 11, 1860, are entirely different, and only a number of cases in the lists of Berlin and Panas correspond to this picture. My remarks will be limited to the latter.

Symptoms.—Imperceptible origin, probably congenital, very slow and unirritative development, gradual straightforward protrusion of the eye, and mobility, sight, and field of vision interfered with in the later stages only. Protrusion of the eyeball either not or only slightly increased by stooping (if increased it indicates a distensible vascular tumor and not one with a rigid capsule). Pulsation absent; bruit absent or not characteristic. For many years the tumor cannot be felt with the finger. Pressure on the eyeball is painless and does not diminish the protrusion. In the later stages the ophthalmoscope shows venous congestion of the retina, neuro-retinitis, and at the posterior pole progressive hyperopia.

A few days after the operation of the case under consideration, I received a description of a case of cavernous lymphangioma by Dr. L. C. Ayres, of Cincinnati, in the

Amer. Journal of Ophth., 1895, p. 321. In its clinical features the case is a duplicate to the one here described. Dr. Ayres removed it successfully with the eyeball, and was kind enough to let me reproduce the drawing of his very instructive specimen. The location, the size (see Fig. 6), and consistence of the tumor scarcely differed from the one above described. A microscopic examination made by Dr. G. A. Griewe discovered it, however, to be a lymphangioma cavernosum, of which it represents only the third case on record.

FIG. 6.

As to the *differential diagnosis* of cavernous angiomata in the depth of the orbit there is a great deal of difficulty, for scarcely in any one of the reported cases the diagnosis was clearly made out before the operation. They may be mistaken for tumors of the optic nerves more than for anything else.

Concerning the *treatment* I think it legitimate to begin the operation of such cases in an exploratory manner. Modern surgery has given to exploratory operations a more important position and wider scope than they formally occupied. I may mention abdominal disease, or, nearer to our department, the intracranial complications of ear affections, where exploratory operations of an astonishing extent are now performed practically without danger. Where there is an exophthalmus of 8–10 *mm* constantly, even if very slowly, increasing, there must be something growing to push the eye forward. If the proptosis is essentially straightforward, the protruding mass has to be looked for within the muscu-

lar funnel. Detachment either of the internal or external rectus will afford sufficient space for establishing the diagnosis and eventually performing the operation. A careful stitching forward of the muscle, exaggerating, as in every case of advancement, the primary effect, will rëinstate the eye to its physiological position and motility. As long as the presence of a tumor is not established I would proceed with the exploratory operation, without detaching a tendon, and enter the muscular funnel between the bellies of two adjacent muscles. That this is possible is proved by a case in which I removed an optic-nerve tumor through the space between the bellies of the external and inferior recti, with permanent preservation of the eyeball. I know that a certain number of cases with the same symptoms as described above have come under my observation, but since the patients did not suffer materially and the protrusion grew very slowly, I did not propose an operation. In future I shall operate on such cases before the eye has become blind by optic-nerve atrophy, or is destroyed by suppuration from exposure.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE SECOND QUARTER OF THE YEAR 1895.

By Dr. ST. BERNHEIMER, in Vienna; Prof. C. HORSTMANN, in Berlin; and Dr. Silex, in Berlin;

WITH THE ASSISTANCE OF

Dr. S. M. Burnett, Washington; Dr. Dantone, Rome; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. P. von Mittlestädt, Metz; Dr. Sulzer, Geneva; Dr. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; Dr. Schiötz and Dr. Ole Bull, Christiania; Dr. R. Greef, Berlin; Dr. Deus, Berlin; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

154. Segal. Report of the eye department of the Charity Hospital of the Physician's Society of Don for 1894. *Wjest. Ophth.*, 1895, May–June.

155. De Vincentiis. Brief report of some clinical observations on eye diseases. *Contributions from the Eye Clinic of the Royal University of Naples*, vol. iv., 2, 5, p. 166.

156. Angelucci. A page on the science of painting. *Arch. di Ottalm.*, vol. ii., 11, p. 1367.

157. Galezowsky. A note on the ocular affections met with in my voyage in Persia. *Rec. d'opht.*, April, 1895.

158. TRUC. Statistics of the geographical distribution of eye diseases. *Nouv. Montpellier médic.*, March, 1895.

159. MEYER, E. A practical treatise on the diseases of the eye. 4th edition, pp. 806 with 261 figures. Masson, publisher, 1895.

160. CHEVALLEREAU. Eye diseases in Vendée. *Soc. franç. d'opht.*, annual meeting, 1895; *Ann. d'ocul.*, cxiii., p. 355.

161. TERSON, ALBERT. A study of the surgery of Pellier de Quengsy. *Arch. d'opht.*, xv., 5, p. 295, May, 1895 (with figures).

162. ESPÉRANDIEU. A collection of seals of Roman oculists. Ernest Leroux, Paris.

163. KUFFMANN. Choice of profession and visual efficiency. *Zeitschr. f. Schulgesundheitspflege*, No. 5, p. 257.

164. SCHWEIGGER. Test-types. 3d improved edition. Hirschwald, Berlin, 1895.

165. WEISS. Test-type charts for determining acuteness of vision for distance. Bergmann, Wiesbaden, 1895.

In the eye department of the Don (154) Hospital, 1530 out-patients and 175 in-patients were treated in 1894. 493 operations were done, among them 63 extractions with iridectomy and 56 without, but in 9 of the latter there was prolapse of the iris later, requiring operation. The resulting acuteness of vision did not differ in the two methods.

DE VINCENTIIS (155) briefly reports cases of pulsating exophthalmus, paralytic convergent squint, mucocele of the ethmoid with pulsation of the ball, and blepharoplasty.

ANGELUCCI (156), in an address before the Association of Artists in Palermo, spoke of the relation of painting to optical laws and to the light-perceiving sense and showed how the painter conceived and utilized the effects of light and dark and contrasts of light and color. Equally interesting were his observations on color-blind painters and on the results of the altered color perception in old age. DANTONE.

Of TERSON'S (161) reports on the works of Pellier de Quengsy, which appeared under the titles *Recueil de mémoires et d'observations*, 1783, and *Cours d'opérations sur les yeux*, 1787, those treating of cataract operations are particularly interesting. De Quengsy, a bitter opponent of couching, used only a single instru-

ment in his extraction—viz., the knife. The upper lid of the seated patient was raised by an assistant, the operator drew down the lower lid and made with his ophthalmotome a section, including the lower half of the corneal margin, at the same time opening the capsule. The cataract was removed by pressure with the finger below and the flat blade of the knife above. Cortical remains were removed with a small spoon and the prolapsed iris replaced when necessary. The operation never required more than a minute and often less than a third of a minute. His critics spoke of the dangers and disadvantages of his method, which required much practice and the greatest skill. The section of the cornea with simultaneous splitting of the capsule seems to have been done then not more frequently than to-day. When there were capsular changes, the capsule was seized with forceps and often the entire lens thus withdrawn. When there was increased tension, the vitreous was first punctured. When the cataract was adherent, the synechiæ were divided with a knife and even the iris cut. De Quengsy used only dry dressings. Prolapse of the iris was punctured, excised, or cauterized. He also performed iridectomy, or drew out the iris with the secondary cataract and cut it off. V. MITTELSTÄDT.

The seals of Roman oculists (162) consisted of fine-grained, quadrilateral plates of stone rarely more than 10 *cm* long, 6 *cm* broad, and 2 *cm* thick. The inscription usually comprised the genitive of the physician's name who made or sold the remedy, the name of the remedy, the disease for which it was adapted, and often the mode of using it. Since 1854, when the instruments of C. Firmius Severus, nineteen in number, together with his seal and forty grammes of collyria, were found at Reims, we know that the remedies were kept in pastille form to be ground up in a mortar and dissolved. ESPÉRANDIEU has catalogued all the seals known, 193 in number, with a list of the Roman oculists and a full bibliography. This interesting and laborious work forms a foundation stone of the technical portion of a history of the ophthalmology of classical antiquity. SULZER.

The excellent test-types of SCHWEIGGER (164) have appeared in a third edition much improved.

WEISS (165) has constructed five charts of test-types for determining the acuteness of vision for distance. The letters are to be read at 6 *m*, and their sequence is arranged according to Monoyer's principle.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

166. CUÉNOD. The pneumococcus in ocular pathology. *Soc. franç. d'opht.*, annual meeting, 1895; *Ann. d'ocul.*, cxiii., p. 364.

167. GUILLOY. On the ophthalmoscopic diagnosis of astigmatism. *Arch. d'opht.*, xv., 6, p. 372.

168. DARIER. Subconjunctival injections of sublimate. A reply to Drs. Mellinger and Gutmann. *Arch. f. Augenheilk.*, xxx., p. 232.

GUILLOY (167) shows by a geometrical construction that in astigmatism the papilla appears oval in the indirect method of examination, and the greater diameter corresponds to the less refracting meridian so long as the lens is not held so far from the eye examined that the observer's eye lies in the conjugate focus of the lens and the nodal point of the eye examined. When the latter is the case the papilla appears round or of its true form, although Giraud-Teulon has stated that such is the case only when the nodal point of the eye examined coincides with the focus of the lens. When the lens is removed still farther from the eye examined the papilla appears oval in the other direction. In like manner Guilloy shows that in the direct examination the long axis of the papillary ellipse corresponds to the more highly refracting meridian, and that, as Mauthner affirmed, the papilla appears the more elliptical the farther away the observer.

V. MITTELSTÄDT.

III.—INSTRUMENTS AND REMEDIES.

169. WICHERKIEWICZ. A pocket campimeter. *Soc. franç. d'opht.*, annual meeting, 1895; *Ann. d'ocul.*, cxiii., p. 357.

170. LAVAGNA. Experiments on the physiological action of a new myotic alkaloid, arecaline. *Boll. d'occul.*, xviii., p. 68.

171. LAVAGNA. On the employment of formaldehyd in ocular therapy, and particularly in affections of the lachrymal sac. *Boll. d'ocul.*, xvii., 5, p. 34,

172. KAZAUROW. The employment of Edison's electromotor in massage of the eye according to the method of the late Professor Maklakoff. *Wratsch*, 1895, No. 22.

173. ALT. Some experiments with an anonymous new local anæsthetic. *Amer. Jour. of Ophth.*, March, 1895.

LAVAGNA (170) made experiments with the hydrobromate of

the alkaloid of the areca nut, and found it to be a valuable myotic. A few drops of a 1 % solution of arecaline cause a pupil of 6½ *mm* to be reduced to 2 *mm* in ten minutes, the effect continuing twenty minutes, and then gradually decreasing for thirty minutes, to give place to a slight mydriasis. The muscle of accommodation is also affected, the action beginning within two minutes, reaching the maximum at the eighth minute, and ceasing entirely in ten minutes. Even a drop of a 1:10,000 solution produces a perceptible myosis lasting ten minutes. DANTONE.

LAVAGNA (171) believes that formol or formaldehyd is an important addition to ocular therapeutics. Although less efficacious than bichloride as a disinfectant, it surpasses it as an antiseptic, and has the added advantage of not affecting metals or alkaloids. He uses a 1:2000 solution, and is pleased with the results, particularly when it is employed as an injection in cases of blennorrhœa of the tear sac. A solution of this strength causes only a slight transitory burning. DANTONE.

KAZAUROW (172) has used Edison's electric style tipped with an ivory ball for occular massage as suggested by Prof. P. Maklakoff. The style is applied directly to the cornea or sclera, a procedure which does not require the use of cocaine. The immediate result is marked hyperæmia of the eye, lachrymation, subconjunctival extravasation, myosis, spasm of the ciliary muscle, and decrease of tension. Glaucomatous attacks were relieved, and episcleritis and parenchymatous keratitis were much improved by this treatment. HIRSCHMANN.

ALT (173) relates his experiences with a remedy which to him is unknown, but which was furnished to him by a thoroughly reliable drug-house. Its anæsthetic effects on the conjunctiva are more prolonged than those of cocaine reaching to twelve or more hours; on the cornea it is less. The mydriatic effect is not so long as that of atropine. The application of the drug in its present form of watery extract is very painful. BURNETT.

IV.—ANATOMY.

174. GIAUNETASIO. The retina of vertebrates. *Ann. di Ottalm.*, xxiv., 1, p. 36.

175. PRIBYTKOFF. On the course of the optic-nerve fibres and their termination in the subcortical centres. *Inaug. Dissert.*, Moscow, 1895.

176. GUTMANN. On the nature of Schlemm's sinus and its relations to the anterior chamber. *Graefe's Archiv*, xli., 1, p. 28.

177. LEBER. The circulus venosus Schlemmii is not in open connection with the anterior chamber (according to experiments undertaken conjointly with Dr. C. F. Bentzen). *Ibid.*, p. 235.

178. ZIEGENHAGEN. Contributions to the anatomy of the eye of the fish. *Inaug. Dissert.*, Berlin, 1895.

GIAUNETASIO (174) gives an extract from the work of Ramon y Cajal on the retina of the vertebrates.

The conclusions of PRIBYTKOFF (175) are as follows: In the guinea pig the decussation of the optic nerve is total; in the rabbit, dog, cat, and in man it is partial. The number of crossed fibres is greater than that of direct. The crossed and the direct fibres do not form separate bundles in the tract or in the chiasm. In the nerve of the dog and cat the direct fibres have a lateral or dorso-lateral position. The crossing fibres occupy the greater ventro-medial portion of the nerve. The commissura arcuata anterior of Hanover does not exist. In man and the higher mammals the location of the crossed and uncrossed fibres in the optic nerve is the same. In the anterior segment of the nerve, in front of the entrance of the central artery, the direct fibres divide into two bundles, a dorsal and a ventral, each lying rather to the lateral side.. In the middle line of the chiasm there are only crossing fibres.

Experiments for the purpose of finding the origin of the optic-nerve fibres were done with Marchi stain and by Gudden's method. He concluded that in the guinea-pig and rabbit the optic-nerve fibres end for the greater part in the anterior corpora quadrigemina, in less part passing with the tractus peduncularis transversus to the tegmentum, and in still less part ending in the corpus geniculatum externum. In the cat and dog the greater part end in the corpus geniculatum externum, a less part in the anterior corpora quadrigemina, and a much less part passes in the tractus peduncularis transversus. Probably a part ends also in the pulvinar. The oculo-motor nucleus is in no direct communication with the optic-nerve fibres. Pupillary fibres run in the tract but their origin could not be found. HIRSCHMANN.

GUTMANN (176) made injection experiments on thirty-five fresh human eyes and six eyes of monkeys in order to determine whether the anterior chamber stood in open connection with the

venous system. He used chiefly India ink and Berlin blue. In each case he was able to fill Schlemm's venous plexus and the adjacent twigs of the anterior ciliary veins, from the anterior chamber.

LEBER (177) by new experiments confirmed his views of twenty-four years ago, that the anterior chamber is not in open commuication with the venous system. In the experiments of Gutmann and others the passage of a coloring matter occurred by filtration, which must take place when the coloring matter is injected under a considerable pressure.

V.—PHYSIOLOGY.

179. GOLOWIN-SERGIUS. Ophthalmotonometric studies. *Inaug. Dissert.*, Moscow, 1895.

180. POLJAKOFF. The determination of refraction by means of sciascopy. Reprint from *Notizen der Terschen Med. Gesellschaft.*, ii.

181. DE BONO. On the causes of the limitation of the normal visual field nasally. *Arch. di Ottalm.*, ii., 11, p. 382.

182. FROMAGET. The relation of amplitude of accommodation to static refraction. *Ann. d'ocul.*, cxiii., p. 399.

183. TRUC. The general and refractive modifications in the eyeball due to the removal of the lens. *Ann. d'ocul.*, cxiii., p. 309.

184. PARENT. The comparative value of objective optometry. Report read at the annual meeting of the *Soc. franç. d'ophtal.*, 1895; *Ann. d'ocul.*, cxiii., p. 321.

185. EATON. The laws of parallel ocular motion and their misstatement in treatises and text-books. *Annals of Ophth. and Otol.*, April, 1895.

186. DUANE. The parallax test for heterophoria. ARCH. OF OPHTH., xxiv., p. 258.

187. DAVIS, A. E. Accommodation in the lensless eye—to what is it due? *Manhattan Eye and Ear Hospital Reports*, Jan., 1895.

188. REBER, WENDELL. Six cases of color-blind women in two generations of one family.

189. BULL. Subjective method of optometry. *Soc. franç. d'ophth.*, annual meeting, 1895; *Ann. d'ocul.*, cxii., p. 358.

190. ABELSDORFF. On the recognition of the visual purple of Abramis broma by means of the ophthalmoscope. Report of the *K. Preus. Akademie der Wissenschaften*, Berlin, April 4, 1895, xviii.

191. KÖTTGEN, ELSE, and ABELSDORFF, G. The varieties of visual purple in the vertebrates. *Ibid.*, xxxviii., 1895.

192. SCHAPRINGER. Does not the perception of the various colors take place in the same layer of the retina? *Pflüger's Archiv*, vol. lx., p. 296.

193. KOSTER. On the percipient layer of the human retina. *Graefe's Archiv*, xli., 1, p. 1.

194. WAGNER, The spontaneous transition of the sun's after-image into a hexagon or octagon. *Zeitschr. f. Psych. u. Physiol. d. Sinnesorgane*, ix., 2, p. 1.

GOLOWIN (179) has undertaken tonomanometric examinations of eyes under the influence of various alkaloids in order to determine the effect of the latter on intra-ocular tension.

He believes the tonometer of Maklakoff to be the most reliable. Experiments with this instrument gave an average normal pressure of 30 *mm* Hg. for the rabbit's eye and 25 *mm* Hg. for the human eye. + T varies from 40–98 *mm* Hg.

In the rabbit a single instillation of 1 % atropine solution causes a slight increase in tension followed by a slight decrease. Repeated instillations cause marked increase in tension. In normal human eyes atropine causes no perceptible alteration in tension. In glaucomatous eyes a single instillation causes increased tension for some hours. Repeated instillations keep up the increased tension.

Cocaine 2 % instilled once into a rabbit's eye causes a brief increase, and repeated instillations a decrease, in tension. In man one instillation causes a slight increase, but repeated instillations have no effect. With + T instillations increase the tension.

Pilocarpine and eserine cause a transient increase in tension, followed by a decrease both in normal eyes and in those with + T. In glaucoma, however, the action of each of these alkaloids varies in different cases. HIRSCHMANN.

In a patient with epilepsy who had suffered from bilateral ptosis and divergent squint from childhood, DE BONO (181) found in the left eye, which was the better of the two and had V = ½, a marked extension of the visual field horizontally, it being 88° inward and 98° outward, an extent that has not been

previously reported. Vertically the field was narrower than the average. This case seems to confirm Landolt's idea, in that the divergence of the eye gave it opportunity for exercising the inner part of the field, while the ptosis prevented the development of the vertical field. DANTONE.

It has been generally believed that the range of acccommodation does not depend upon the refraction. Examination of 408 scholars between the ages of seven and twenty showed FROMAGET (182) that at seven years the range of accommodation is 14. D, and at ten years 13.8 D, after which age it decreases more rapidly, to be reduced to 10. D at the age of twenty. He found, however, that from the tenth year on the range of accommodation is increasingly greater in hyperopic than in emmetropic eyes, and that from the fifteenth year on the range in myopic eyes is correspondingly less than in emmetropic. SULZER.

In order to explain the variation in the strength of convex glass required to correct the refraction after removal of the crystalline lens, TRUC (183) undertook to make accurate measurements and estimates of volume of the normal rabbit's eye, and of similar eyes after removal of the lens. He found the right eye of the rabbit, as a rule, somewhat larger than the left, and the measurement of fifteen right eyes, after removal of the lens, showed them to be, as compared with the non-operated left eye, on an average 0.20 grammes lighter, 0.13 *cc* smaller, and 0.6 *mm* shorter. SULZER.

PARENT'S (184) discussion of the comparative value of the different optometric methods contains a careful and complete exposition of the present status of optometry. It thus forms a supplement to the text-books, which have treated the subject sometimes too briefly, sometimes too extensively, but always incompletely. SULZER.

EATON (185) combats the view expressed by Donders, and since then repeated in every text-book, that the vertical meridian of the eyeball in all oblique positions of the line of vision is inclined in the same direction as the after-image, *e. g.*, to the right when the eye looks up and to the right, or down and to the left. He believes, with Helmholtz and Hering, that a rotation takes place in an opposite sense, and thinks that he has proved this experimentally. He lays stress on the importance of the matter in the diagnosis of ocular-muscle paresis, and in the determination of heterophoria.

DUANE (186) gives a ready and delicate means of estimating heterophoria. The patient, having one eye covered with a card, fixes with the other eye a spot on a large flat surface. If the covered eye is also directed at the spot, *i. e.*, if there is orthophoria, the spot will appear to remain stationary when the card is shifted to the other eye. If, on the contrary, the spot appears to move, heterophoria must be present. The movement is called parallax, and its amount and character indicate the degree of heterophoria. Thus if, when the left eye is uncovered, the spot appears to move to the left and down, it is proof that the left eye behind the screen was directed up and in (hyperesophoria). The amount of the deviation can be measured quite accurately if the prism which placed before the eye will abrogate the movement is found.

DAVIS (187) goes extensively into the question of A in the aphakic eye, and refers to all the extant literature on the subject. He reports two cases in full which he had examined by all the tests, objective and subjective, before and after a mydriatic had been used. He found no change in the curvature of the cornea as measured by the ophthalmometer. In one case the patient read No. 10 at 20 feet, and No. 1 at 18 inches, with the same glass (+ 11.50). In the other, with + 16, the patient (a boy) read No. 20 at 20 feet, and No. 1 at 14 inches. Davis concludes that the accommodation in the lensless eye is due chiefly, if not solely, to the ability of the patient in such cases to interpret dispersion circles. BURNETT.

REBER'S (188) patient, a woman of fifty, stated that she had been color-blind all her life, and that her two sons were similarly affected. Her three sisters and her brother had also a defect of color perception. Two brothers and three sisters of her father were also color-blind. BURNETT.

BULL (189) shows that the rule to correct myopia with the weakest concave glass and hyperopia with the strongest convex glass that will give greatest acuteness of vision, must necessarily lead to overcorrection of myopia and undercorrection of hyperopia when there is astigmatism present. In order to find the proper correcting glass, he advises finding, by means of the radiating lines, after ophthalmometric examination, that spherical glass which renders emmetropic the meridian of less curvature. The astigmatism is then in all cases to be corrected by a concave cylinder, since the convex glass which renders emmetropic the meridian of less curvature reduces each case to one of simple myopic astigmatism. SULZER.

ABELSDORF (190) was able to recognize with the ophthalmoscope in the eye of the fish Abramis Broma, the red of the visual purple in the dark and its disappearance in the light.

KÖTTGEN and ABELSDORFF (191) have endeavored by means of accurate spectral photometric measurements of the absorption of the visual purple in mammals, to determine whether the various sorts of visual purple are fixed types or a variety of transition forms. Sixteen species were experimented with, and two sorts of visual purple were found, one in mammals, birds, and amphibians, with the maximum of absorption at a wave length of 500 *mm*, the other in fishes with the maximum of absorption at 540 *mm*, both being in the green. A visual yellow was never found, illumination causing simply a progressive decrease in the concentration of the purple and finally its disappearance.

Koenig and Zumft, using monochromatic light, found that the double shadows of the retinal vessels produced by the light passing through two perforations in a screen were farther apart when red light was used than when blue, and hence concluded that the layer of the retina perceiving red lies deeper than that perceiving blue.

KOSTER (193) was not able to obtain two shadows of the vessels, and other experiments and computations led him to doubt the correctness of the views of Koenig and Zumft.

Sections VI.–XI. Reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

195. ZIMMERMANN. Hypermetropia of high degree with a study of cases. *Annals of Ophth. and Otol.*, April, 1895.

196. LANDOLT. The correcting glass for presbyopia. *Arch. d'opht.*, XV., 5, p. 273.

Out of 1789 cases of refraction ZIMMERMANN (195) found 58 cases of H above 5 D. The highest was 12 D. Seven eyes presented H of 10 D or more. From a study of these cases the author concludes that they are always congenital and show no tendency to increase, and that there is no special change in choroid or retina. Astigmatism is present in about half the cases, and strabismus convergens in 27 %, and is more common in the lower degrees. The asthenopia complained of bears no relation to the degree of the defect. BURNETT.

In place of Doders' table of glasses, which are too strong in old age, LANDOLT (196) gives another which is better adapted for practical purposes, *i. e.*, for a working distance of 20 *cm.* The rule is that prolonged near work is possible only when not more than $\frac{2}{3}$ of the range of accommodation is employed. Landolt determines the range of accommodation, and takes $\frac{2}{3}$ of it reckoning in the refraction as accommodation that can be utilized. The proper glass for near working is that which combined with $\frac{2}{3}$ of the range of accommodation is equal to the dioptric value of the working distance. A table constructed on this principle for ages from 40 to 70 in 5-year intervals, is as follows: 0.25, 1., 1.5, 2., 2.5, 2.75, 3.5. V. MITTELSTÄDT,

VII.—LIDS.

197. DESPAGNET. Palpebral scleroderma. *Ann. d'ocul.*, cxii., p. 273.

198. MIBELLI. Trichophytic blepharitis and its treatment. *Semaine méd.*, Dec. 25, 1894.

199. PICCOLI. Lymphosarcoma of the plica semilunaris. *Lav. d. clinica ocul. d. R. Univ. di Napoli*, iv., 2, p. 147.

200. UHTHOFF. A contribution to blepharoplasty. *Deutsche med. Wochenschr.*, No. 30, 1893.

201. PERGENS. A contribution to the subject of priority in lid operations. *Zehender's klin. Monatsbl.*, xxxiii., p. 206. A polemic paper against Schwabe.

202. THIER. On the trichiasis operation. *Centralbl. f. prakt. Augenheilk.*, p. 200, 1895.

203. OLIVER. Description of the method of operation employed for the removal of an epithelioma involving both the upper and lower lid at the outer palpebral commissure. *Will's Eye Hospital Reports*, Jan., 1895.

204. SCHWENK. Pediculi ciliaris; with a report of a number of cases of "crab-lice" in the eyelashes. *Ibid.*

205. KEYSER. Blepharoplastics. *Ibid.*

206. HUNTER. A case of vaccinia palpebrarum. *New York Eye and Ear Infirmary Reports*, July, 1895.

DESPAGNET (197) presented to the Paris Ophthalmological Society a sixteen-year girl in whose left upper lid a slightly prominent plaque had developed, surrounded in the beginning by a

violet zone. The lashes had fallen out in the affected part. The consulting dermatologists who saw the patient pronounced it a case of scleroderma of the lid of the variety known as morphœa alba plassa. SULZER.

MIBELLI (198) in several cases of blepharitis ciliaris found the trichophyton on the epilated lashes. The cases resemble ordinary blepharitis. The therapy consists in systematic epilation of the cilia, washing the lid margin with 0.2 % bichloride solution and the use of tincture of iodine in alternation with a salve composed of sulph. sublimat. 0.6, acid salicyl. 0.4, and vaseline 20. SULZER.

PICCOLI (199) describes a tumor of the semilunar fold which grew in a few months from the size of a pea to that of an almond. It proved to be a neoplasm arising from the connective tissue of the fold and belonged in the category of lympho-sarcoma. DANTONE.

UHTHOFF (200) reports a case of complete removal of the lower lid for carcinoma in a woman of fifty-eight. The defect was covered by bringing down a skin flap from the upper lid, which was in turn replaced by a frontal flap. On the seventh day the flap was separated from the upper lid and the palpebral fissure restored.

For the cure of trichiasis THIER (202) excised a 3 *mm* broad strip of skin between the brows and lashes, and closed the wound with sutures. The lid margin is then split and the excised strip of skin placed in it.

The tumor in OLIVER'S (203) case was on the cheek, at the outer commissure of the left eye, drawing down the outer canthus. The tumor was removed and the space left was filled with sliding flaps from the temple and cheek in front of the ear. There were two of these flaps side by side, which were so shaped as to fit into each other and fill the space better than a single one could have done. A tongue-shaped flap was taken from under the crown, twisted round, and fitted into the outer canthus. The flaps were cut thin with clean edges and free from fat. They healed nicely and five months after the operation scarcely any scars were visible. BURNETT.

SCHWENK (204) reports quite a number of cases of crab-lice on the eyelashes, and gives a pretty thorough exposition of the literature on the subject. BURNETT.

KEYSER (205) reports five cases of blepharoplasty, in most of which there was an enormous amount of cicatricial tissue around

the eye. This cicatricial tissue he softens by having neatsfoot oil rubbed in daily sometimes for as long as fourteen months. This makes the tissue pliable, and in one case he succeeded in making good lids by transplantation. But the other cases were treated by thin grafts from the arms. His grafts shrank to about one half the original size. He follows the careful procedures as regards details which other successful experimenters have used. He thinks it important that the tears should be kept away from the grafts, and for this purpose uses a bit of absorbent cotton placed where it will take up the liquid as fast as it is secreted.

BURNETT.

HUNTER's (206) patient was a child of three years, who was inoculated with vaccine matter on the lower lid of the right eye by a scratch from a playfellow. The recovery was good, with no deformity. BURNETT.

VIII.—LACHRYMAL APPARATUS.

207. LAFITE-DUPONT. Imperforate lachrymal points. *Ann. d'ocul.*, cxiii., p. 283.

208. MAZET. Bacteriological researches on empyema of the lachrymal sac. *Ibid.*, p. 367.

209. CIRINCIONE. Dacryocystitis of the new-born. *Lavori d. clin. ocul. d. R. Univ. di Napoli*, iv., 2, p. 105.

210. ELSCHNIG. Actinomyces in the canaliculi. *Zehender's klin. Monatsbl.*, xxxiii., No. 188.

211. HALTENHOFF. Traumatic prolapse of the orbital lachrymal gland. *Ann. d'ocul.*, cxiii., p. 319.

212. NOVELLI. Some considerations on a congenital lachrymal tumor. *Boll. d'ocul.*, xvii., 8, p. 60.

213. SNELL. On the use of large probes in the treatment of lachrymal obstruction. *Ophth. Review*, xiv., p. 101.

In an infant with congenital epiphora LAFITE-DUPONT (207) found a complete absence of both lachrymal points in the left eye. The mother and grandmother had normal points, but had suffered from youth with epiphora. A brother of the patient was operated on for an imperforate cyst of the lachrymal sac.

MAZET (208) divides the suppurations of the lachrymal sac into two groups, the acute phlegmonous empyema and the subacute cystic empyema. The former is caused chiefly by the

streptococcus and the bacillus coli, the latter by the staphylococci or other pathogenic microbes. In all cases saprophytes are found.
SULZER.

CIRINCIONE (209) examined the body of an infant of eighteen days that in life had suffered from dacryocystitis, and found a complete blocking of the nasal end of the lachrymal duct. The duct was normally formed, but was filled with a granular mass, which proved to be composed of degenerated epithelial cells and leucocytes. DANTONE.

ELSCHNIG (210) removed from a distended upper canaliculus, after splitting it open, a granular mass, which microscopic examination proved to be actinomyces.

HALTENHOFF'S (211) patient, a child of three years, fell on some broken stones, and received a wound through which the orbital lachrymal gland protruded. This was excised, and primary union was secured. In the operation a bright red mass was seen in the wound—the palpebral lachrymal glands. After the removal of the orbital gland the eye kept as moist as the other, and in crying the same amount of tears came from each eye, thus indicating that the tear secretion in crying comes from the palpebral glands alone. SULZER.

NOVELLI (212) saw in a new-born infant a tumor of the lachrymal sac the size of a cherry, which emptied into the conjunctival sac when pressed. The contents were a yellow lachrymal secretion. The infant had a flat bridge of the nose, but all the ocular structures were normal. He concluded that the cause of the retention was a narrowing or closure of the nasal end of the canal.
DANTONE.

SNELL (213) has used probes from 1.25 *mm* to 4 *mm* in diameter with satisfactory results. They are made of silver and can be readily bent. His experience with them extends to sixteen years, and he finds them much better than the usual small probes.

IX.—MUSCLES AND NERVES.

214. AUDÉOUD. A note on hereditary nystagmus. *Ann. d'ocul.*, cxiii., p. 413.

215. HOTZ. On the alleged action of the oblique muscles in oblique astigmatism. *Annals of Oph. and Otol.*, April, 1895.

216. PRENTICE, CHALMER. A new operation for the advancement of the recti. *Ibid.*

217. POMEROY. Cases in ophthalmic practice (muscular troubles). *Manhattan Eye and Ear Hospital Reports*, Jan., 1895.

218. STEVENS. On alternating vertical strabismus and symmetrical vertical deviations less pronounced than strabismus. *Ann. d'ocul.*, cxiii., pp. 225 and 385.

AUDÉOUD (214) gives the clinical histories of 7 cases of cerebral hereditary nystagmus. The transmission occurred only in the female line, and in most of the cases the acuteness of vision was normal. SULZER.

HOTZ'S (215) shows in this paper that the statements of Savage relative to the alteration in the direction of lines formed on the retina by means of oblique astigmatism has no basis in optics. He demonstrates experimentally that a cylindric lens when rotated before a refracting system, while it has an effect on the size of the image, and its shape, does not alter its direction. Neither has he been able to find clinically the obliquity of the third line in experimenting with the double prism as done by Savage. BURNETT.

PRENTICE'S (216) modification of the suture operation for advancement of the interni consists in the use of a grooved plate of aluminium over which the ligature is thrown and rests at the corneal end of the suture. The tendon is exposed by a horizontal cut in the conjunctiva and the suture introduced as far back from the insertion as it is thought necessary for the proposed correction. The suture is then carried through the corneal end of the tendon and the loop loosely tied. Under this loop the grooved plate is introduced, and being larger than the suture it pulls on the distal end of the ligature and brings it nearer the cornea. The amount of their advancement is graded by the size of the plates. They range in size from 4 to 12 or more millimetres. He does not cut the tendon between the two ends of the suture. The operation is a folding up of the tendon as in de Weeker's capsular advancement. BURNETT.

The muscular anomalies which Pomeroy (217) reports in his cases from opthalmic practice are: (1) A case of hyperphoria with asthenopic symptoms completely relieved by a single tenotomy of the superior rectus of right eye, although properly-fitting glasses had been previously worn. (2) A case of headaches, etc., relieved by tenotomy of inferior rectus of left, the hyperphoria being relieved as well as some of the exophoria. (3) Operation for exophoria and hyperphoria with moderate relief in a myopic

subject. (4) A case of asthenopia with exophoria and hyperphoria in which both externi and the sup. rectus of the right were divided with only moderate success. (5) A case of convergent strabismus in a patient thirty-five years of age cured by spherocylindrical glasses. (6.) Restoration of binocular single vision in a case of divergent strabismus with a high degree of myopia after tenotomy of the externi. BURNETT.

STEVENS (218) has devoted much attention to the vertical deviations of the line of vision, both the true strabismus sursumvergens, mostly alternating, and hyperphoria. Numerous recorded histories of cases show that strabismus convergens of high degree may be cured by correcting the lack of vertical balance of the muscles. SULZER.

X.—ORBIT AND NEIGHBORING CAVITIES.

219. MITVALSKY. Some remarks on orbital thrombo-phlebitis. *Ann. d'ocul.*, cxiii., p. 347.

220. GALLENGA. On the presence of cartilaginous nodules in the orbital cavity. *Arch. di Ottalm.*, ii., 9–10, p. 275.

221. COPPEZ, H., JR. Six cases of osteoma of the frontal sinus. *Arch. d'opht.*, xv., 5, p. 279.

222. JOCQS. A contribution to the diagnosis of the vascular tumors of the orbit. *Ann. d'ocul.*, cxiii., p. 347.

223. TAILOR. Veno-cystic angioma of the orbit. *Lav. di clin. ocul. d R. Univ. di Napoli.*, iv., 2, p. 137.

224. KALT. Orbital fibro-sarcoma. *Ann. d'ocul.*, cxiii., p. 347.

225. ROHMER. Orbital tumor from dilatation of the ethmoid sinus. *Ibid.*, p. 346.

226. LAGRANGE. Congenital malignant tumor of the orbit. *Ibid.*, p. 345.

227. PANAS. Empyema of the maxillary sinus complicated with osteo-periostitis of the orbit and perforation of the roof, abscess in the frontal lobe and atrophy of the optic nerve. *Acad. de méd. de Paris*, March 12, 1895.

228. RICHTER. On intermittent exophthalmus. *Arch. f. Augenheilk.*, xxxi., p. 31.

229. STUELP. A case of traumatic pulsating exophthalmus with atrophy. *Ibid.*, p. 23.

230. GRUENING. A case of empyema of the ethmoid cells. Operation from the orbit. Speedy recovery. *New York Eye and Ear Hospital Reports*, Jan., 1895.

231. GOODMAN and ZIEGLER. Dermoid cyst of the orbit. *Wills' Eye Hospital Reports*, Jan., 1895.

232. BARNES, J. L. The course and fate of enucleation at the Manhattan. *Manhattan Eye and Ear Hospital Reports*, Jan., 1895.

233. RAIA. Retraction of the eyes in a case of abolished adduction and abduction. *Med. News*, May 4, 1895.

MITVALSKY'S (219) observations on venous thrombosis of the orbit led him to the following conclusions: In direct or centripetal venous thrombosis vision is preserved until death, while in centrifugal venous thrombosis vision is abolished when exophthalmus and chemosis appear. In the former case the central vein of the retina and a number of the smaller veins remain free, while in the latter case all the veins are occluded and the retinal circulation is stopped in the beginning of the disease. SULZER.

COPPEZ (221) reports six cases of osteoma of the frontal sinus, five of which were operated on ten, five, and three years before, while in the other case operation was refused. In the first case, in which there was inflammation of the mucosa and the tumor extended deep, only the orbital portion was removed. Later a fistula formed causing ectropium of the upper lid, and ten years later the eye was lost from panophthalmitis. Of the six patients four were between the ages of twenty and twenty-four. Coppez believes the process to be similar to that of the formation of a dermoid cyst. Pain is not a sure sign of sinus disease. Inflammation of the mucosa, as the first case teaches, is a dangerous complication, and arises from closure of the canal when the tumor springs from the posterior portion of the sinus. Such tumors can hardly be removed completely, but those springing from the anterior wall can be easily removed and the prognosis here is good. MITTELSTÄDT.

TAILOR (223) gives a histological description of an orbital tumor removed by De Vincentiis, with preservation of the eyeball and vision, which proved to be a cystic venous angioma.

DANTONE.

Congenital malignant tumors of the orbit are rare. LAGRANGE (226) observed such a case in the children's hospital in Bordeaux,

in which the structure of the tumor is noteworthy. At birth it was as large as a pear, and filled the distended orbit without being connected with the ball or the nerve, and extended through the sphenoidal fissure into the cranial cavity. The tumor consisted of two sorts of tissue—connective tissue and nerve tissue, the latter similar to the tissue found in the brain and cord early in their development. SULZER.

RICHTER'S (228) patient was a girl of fourteen, whose right eye became prominent when she bent forward, and was retracted spontaneously when she stood erect. Compression of the carotid did not affect the condition, which was thought to be due to varicose dilatation of the orbital veins.

STUELP (229) describes a pulsating left exophthalmus in a man of forty-nine, who had fallen, striking his head, a month before. When the patient died, shortly after, a rupture of the internal carotid in the cavernous sinus was found, due to fracture of the base.

GRUENING'S (230) case is peculiar in that there were none of the nasal symptoms which usually accompany ethmoidal disease. There was no pain or anything to direct attention to the orbit except a small swelling above the inner canthus. This was aspirated and pus found. It was then laid open and a quantity of inodorous pus evacuated. The bone itself did not seem to be affected. The floor of the ethmoid was perforated, and the cavity drained through the orbital incision. Recovery prompt. BURNETT.

In "Some Clinical Methods and Memoranda," GOODMAN and ZIEGLER (231) mention and picture a case of dermoid cyst which sprung from the inner upper angle of the orbit, and which on exploration was found to have its seat in the frontal sinus. It was curetted successfully. BURNETT.

During the year ending October, 1894, there were 60 enucleations made at the Manhattan Eye and Ear Hospital (232). Of these, 23 were for wounds of the globe ; 19 for phthisis bulbi ; 6 for panophthalmitis ; 4 for tumors of the orbit ; 4 for foreign body ; 3 for staphyloma ; 2 for irido-cyclitis ; and 1 for glaucoma. BURNETT.

In the case reported by RAIA (233) there was a congenital abolition of adduction and abduction in both eyes. Binocular vision was possible only in fixation directly in front. When an effort was made to converge, the eyeballs were retracted into the orbit for a distance of 2 or 3 *mm.* At the same time the lids

showed movements of oscillation. There was compound hypermetropic astigmatism with full vision in one eye, but slightly reduced vision in the other. BURNETT.

XI.—CONJUNCTIVA, CORNEA, SCLERA, AND ANTERIOR CHAMBER.

234. VACHER. Treatment of conjunctivitis by prolonged subpalpebral irrigations. *Ann. d'ocul.*, cxiii., p. 360.

235. MORAX. Diphtheritic conjunctivitis; its treatment with antitoxin. *Ibid.*, p. 238.

236. KÖNIGSHÖFER. A case of diphtheria of the conjunctiva treated with antitoxin. *Med. Corr. Bl. d. Würtemberger Landesvereins*, No. 13, 1895.

237. RECKEN. Antitoxin in diphtheria of the conjunctiva. *Centralbl. f. prakt. Augenh.*, 1895, p. 229.

238. DARIER. Pseudo-membranous conjunctivitis due to streptococci; unsuccessful antitoxin treatment. *Ann. d'ocul.*, cxiii., p. 427.

239. WERTHER. The question of the treatment of trachoma. *Wojenno. Med. Journ.*, April, 1895.

240. GEIGER. On the mechanical treatment of trachoma, together with the use of bichloride. *Wiener med. Wochenschr.*, 1895, No. 28.

241. BOCCHI. Clinical and anatomical researches on the surgical treatment of trachoma. *Arch. di Ottalm.*, ii., 7–8, p. 243.

242. MALGAT. Treatment of granular conjunctivitis by electrolysis. *Rec. d'opht.*, 1895, No. 2, p. 98.

243. GASPARINI. Conjunctivitis due to the pneumococcus. *Ann. di Ottalm.*, xxiii., 6, p. 475.

244. CIRINCIONE. Osteoma of the conjunctiva. *Lav. d. clin. ocul. d. R. Univer. di Napoli.*, iv, 2, p. 99.

245. SGROSSO. On the morphology and varied structure of pinguecula. *Ibid.*, p. 119.

246. DESCHAMPS. Methodical scraping of the cornea in the treatment of pterygium. *Ann. d'ocul.*, cxiii., p. 362.

247. WEEKS and DERBY. A case of pseudo-membrane of the conjunctiva. *New York Eye and Ear Infirmary Reports*, Jan., 1895.

248. WILSON, W. R. The treatment of conjunctivitis neonatorum by irrigation with sterilized water. *Med. News*, April 13, 1895.

249. WEEKS. The status of our knowledge of the etiological factor in acute contagious conjunctivitis. *New York Eye and Ear Infirmary Reports*, Jan., 1895.

250. FRANCISCO, H. A. Tabulated report of 40 cases of ophthalmia neonatorum. *Ibid.*

Bacteriological examinations have thrown the long-wished-for light on the pseudo-membranous affections of the conjunctiva. MORAX (235) states that it is necessary to inoculate animals with cultures of the conjunctival secretion in order to differentiate the pseudo from the true diphtheria bacillus. In true diphtheritic conjunctivitis the results of antitoxin treatment are striking.

SULZER.

KOENIGSHÄFER'S (236) patient, a child of two years, had diphtheria of the conjunctiva with ulceration of the right cornea. Two injections of Behring's serum led to recovery.

RECKEN (237) used antitoxin in an infant of eighteen months with bilateral diphtheria of the conjunctiva and ulceration of the right cornea. The result was good.

WERTHER (239) differentiates three stages of trachoma: 1. The follicles are present only in the lower lid and the angles of the upper lid. 2. Follicles are present in the entire extent of both lids. 3. Cicatricial degeneration. The use of Knapp's forceps and massage with bichloride is recommended.

HIRSCHMANN.

GEIGER (240) advises expressing and scraping out the trachoma follicles and rubbing the conjunctiva with cotton dipped in 1:2000 bichloride.

BOCCHI (241) subjected a number of cases of trachoma, and particularly those with extensive hypertrophy, to the surgical treatment suggested by Knapp. After this experience he gave up the mechanical treatment. After the first two weeks the patients feel better, but when the irrigations with bichloride are left off, there are recurrences and the scars irritate the cornea and bring back the pannus. (The expression treatment is indicated only in follicular and diffuse trachoma.—H. K.)

GASPARINI (243) states that he published his investigations on the presencce of Fränkel's diplococcus in purulent inflammations

of the conjunctiva in 1893, a year before the publication of Parinaud and Morax. DANTONE.

CIRINCIONE (244) describes a tumor 8 *mm* long, 5 *mm* broad, and 1 *mm* thick removed from the conjunctiva of the outer-upper segment of the eyeball, which proved to be a plate of bone imbedded in the submucosa. DANTONE.

SGROSSO (245) gives a histological report on 48 pingueculæ, 6 from the episclera, the rest from the conjunctiva. In the former the conjunctiva was scarcely involved, of the latter he distinguishes a purely epithelial, a connective-tissue, and a mixed form. The epithelial form (not only epithelial invagination, but a true cyst structure) is treated of extensively, since it has not been previously described. The author does not believe that pterygium can develop from pinguecula, as the structure is so different. DANTONE.

After separating a pterygium from its base, and before the plastic operation is done, DESCHAMPS (246) scrapes the denuded surface of the cornea with a sharp spoon. He prefers this to the employment of the galvano-cautery, and believes that it prevents recurrence. SULZER.

The patient of DERBY'S (247) had, once before, in 1889, an attack of membranous conjunctivitis, from which she recovered without any damage to the eye. In 1894 she had another attack, more severe, in which the whole conjunctival surface was involved. The surface was left raw and bleeding when the membrane was removed. There was associated with this an abscess of the lower lid of the affected (right) eye. The membrane rapidly re-formed after removal several times. Some increase of temperature was noted, with a feeling of malaise and anorexia. The cornea became ulcerated and staphylomatous, and the eye was finally removed.

WEEKS made a careful study of the membrane by culture and inoculation, but was not able to find the Klebs-Loeffler bacillus, nor to produce infection in the eyes of rabbits. In culture he found only a streptococcus. BURNETT.

WILSON (248) reports five cases of conjunctivitis of new-born infants successfully treated with irrigation with sterilized water alone. It must be stated, however, that they were all mild cases, appearing, none of them, earlier than the fifth day after birth, and in none was there any evidence of gonorrhœa. BURNETT.

WEEKS (249) again gives an account of the clinical history,

course, pathology, etc., of the form of acute contagious conjunctivitis described by him in 1887. The bacillus he found then had been noticed by Koch in Egypt in 1883, and the subsequent experiments of Kartulis, Hansell, and Morax have confirmed the results of Weeks, published at that time, that this was a special disease, caused by a bacillus of a peculiar kind, which he figures in a plate accompanying the paper. BURNETT.

A bacteriological examination was made in each of the cases reported by FRANCISCO (250). Thirty were gonorrhœal. In ten no gonococci were found, but Weeks's bacillus of acute conjunctivitis was. All the gonorrhœal cases appeared before the fourth day. Many of the gonorrhœal cases were of mild type, but all of the severe cases were gonorrhœal. No perforation of the cornea occurred after treatment was begun. In no case of the non-gonorrhœal form was the cornea attacked. In four cases of the sixty gonorrhœal eyes there was staphyloma as a result. The majority of the mothers had a vaginal discharge preceding confinement. The treatment was washing with boric acid, cold cloths, and one to four per cent. silver once a day. BURNETT.

251. NUEL. Anatomical description of an eye with an ulcer of the cornea and hypopyon. *Arch. d'opht.*, xv., 6, p. 337.

252. DE WECKER. On the employment of copious subconjunctival injections. *Ann. d'ocul.*, cxiii., p. 408.

253. CHIBRET. The common etiology of keratitis and choroiditis parenchymatosa. *Ibid.*, p. 343.

254. MILLIE. On interstitial keratitis in acquired syphilis. *France méd.*, 1895, No. 12.

255. ALBRAND. Remarks on some external diseases of the eye. *Deutsche med. Wochenschr.*, 1895, Nos. 25 and 26.

256. GIGLIO. On primary tuberculosis of the cornea. *Ann. di Ottalm.*, ii., 9–10, p. 324.

257. DUBOIS DE LAVIGERIE. Ocular accidents to a bicyclist. *Ann. d'ocul.*, cxiii., p. 274.

258. ELSCHNIG. Inflammation of the eye from caterpillar hairs. *Zehender's klin. Monatsbl.*, xxviii., p. 182.

259. HILBERT. A foreign body in the cornea for 1½ years. *Ibid.*, p. 280.

260. DE VINCENTIIS. The galvano-cautery in keratoconus *Lav. d. clin. ocul. d. R. Univ. di Napoli*, iv., 2, p. 178.

261. AXENFELD. A further observation of corneal curvature the opposite to keratoconus. *Arch. f. Augenheilk.*, xxxi., p. 336.

262. RING, F. W. Foreign body in sclera for thirteen years. *Annals of Ophth. and Otol.*, April, 1895.

263. RISLEY. Corneal abrasion. Dense white opacity following the use of a lotion containing acetate of lead. *Wills Eye Hospital Reports*, Jan., 1895.

264. FRIDENBERG, PERCY. A geometrical system of opaque lines in the cornea : an undescribed sequela of interstitial keratitis. *New York Eye and Ear Infirmary Reports*, Jan., 1895.

265. SCOTT, K. Short notes of a case of natural cure of pterygium. *Ophth. Review*, xiv., p. 133.

266. JACKSON. The removal of powder grains from the cornea and skin by the galvano-cautery. *Ibid.*, p. 104.

NUEL (251) describes an eye with a typical serpent ulcer removed from a man of fifty-five, dead of pneumonia. The pus in the anterior chamber did not come from the ulcer, since Decemet's membrane was intact, as was also the posterior thirds of the cornea. The hypopyon in some places extended upward to the ulcer and the pupillary margin. That lying on the iris was composed almost entirely of fibrin, but was more cellular near the cornea. The endothelium was wanting near the ulcer and on the surface of the iris. The collection of pus on Descemet's membrane extended downward in stripes to the chamber angle, and then appeared in the posterior chamber and along the ciliary body as far as the ora serrata. Behind this was a small abscess in the vitreous. The vessels of the ciliary body were not dilated, and there was no infiltration about them. Nuel concludes that the pus comes from the vessels near Schlemm's canal while the fibrin is furnished by the surface of the iris, which is denuded of its endothelium. V. MITTELSTÄDT.

DE WECKER (252) speaks of the surprising therapeutic effect in cases of corneal suppuration of subconjunctival injections of a half or whole syringeful of 1:2000 bichloride solution. This is used, without other treatment than bandaging the eye, in the following combination :

Hydr. bichlor.....0.015
Eserin. salicyl.....0.05
Aq. dest. sterilis.....30.—

When iritis is present the eserine may be replaced by a mydriatic. SULZER.

CHIBRET (253) ascribes parenchymatous choroiditis and interstitial keratitis to the same cause, which is not hereditary syphilis. Mercurial treatment gives good results in both, and rightly used may prevent the affection of the second eye. SULZER.

Since our attention has been called to interstitial keratitis in acquired syphilis, many such observations have been made. MILLIE (254) saw a typical unilateral case which yielded to general and local treatment in a month. SULZER.

Among 13,100 eye patients ABBRAND (255) saw parenchymatous keratitis 91 times and parenchymatous infiltration 32 times. These were mostly in young people. Hereditary syphilis was found in 40, and acquired in 18. He saw also 53 cases of episcleritis. Adults were affected chiefly and relapses were common. In 11 per cent. there was a complicating iritis, and in 7 sclero-uveitis antica.

GIGLIO (256) reports that in the Palermo clinic an obstinate corneal ulcer was diagnosed tuberculous, and when the iris became affected the eye was enucleated to prevent general infection. No Koch bacilli were found directly, but appeared in agar cultures. The author supposes that the so-called asthenic ulcers can be traced to a tuberculous basis.

A bicyclist, after a twenty-four hours' run in cold weather, noticed a blurring of the sight after the eighteenth hour. DUBOIS DE LAVIGERIE (257) found a diffuse infiltration of both corneæ, which cleared up under the use of warm applications.

SULZER.

A small caterpillar was thrown against the right eye of a girl of fourteen, and a few hours after ELSCHNIG (258) saw a severe conjunctivitis and superficial keratitis. Caterpillar hairs were found on the surface of the cornea. After the cessation of the first severe signs of irritation, the hairs imbedded in the corneal tissue and the epithelium were borne and were gradually absorbed.

In HILBERT'S (259) case the wing sheath of a beetle lay imbedded in the cornea for a year and a half without causing irritation.

DE VINCENTIIS (260) treated a case of keratoconus by means of the galvano-cautery. Three applications in the course of twenty days brought him to the membrane of Descemet which was punctured. A fistula remained for two weeks. After it closed a thick smooth scar formed and after an iridectomy had been made useful vision was obtained. DANTONE.

AXENFELD's (261) patient had a corneal affection of the right eye at the age of two. When seen at the age of thirteen there was a central depression of the cornea so that in the centre there was hyperopia of 5 D, while in the periphery there was myopia of 8 D.

RING (262) reports a case where a bit of thorn 4 *mm* long and 1 *mm* at its base, remained imbedded in the sclera 10 *mm* behind the cornea without causing trouble for thirteen years.

BURNETT.

In the case reported and figured by RISLEY (263) there was a white spot on the apex of the cornea such as is considered typical of a deposit of lead following a lead lotion on an abrasion of the corneal surface. The deposit was removed and was found to occupy the epithelial layer. Bowman's layer was slightly opaque. A careful chemical test failed to reveal the least trace of lead in the particles removed. BURNETT.

FRIDENBERG (264) figures a peculiar geometrical figure of fine perfectly straight lines deep in the structure of the cornea and apparently permanent as a sequela of interstitial keratitis in a woman thirty years of age. It is certain that these lines are not the remains of blood-vessels, but are, in the opinion of the author, most probably connected with the lymph spaces in the cornea and suggest a fatty infiltration of these canals. BURNETT.

In SCOTT's (265) case the patient stated that after an acute inflammation of the eye her sight which had been impaired became almost as good as ever. The remains of a pterygium were visible at the inner side of the cornea, and opposite to them a slight, irregular, clear depression on the cornea.

JACKSON (266) uses a small cautery, such as is employed for corneal ulcers, and each pigment spot is touched with it, causing a minute scar which is much less disfiguring than the powder grains. The cautery may also be used for other substances such as coal, etc., and it has the advantage of destroying micro-organisms.

267. FUCHS. On episcleritis periodica fugax. *Wien. klin. Wochenschr.*, No. 35, 1895.

268. HARLAN. Three cases of cilia in the anterior chamber. *Wills Eye Hospital Reports*, Jan., 1895.

By episcleritis periodica fugax FUCHS (267) understands a severe inflammation of the bulbar conjunctiva and particularly the subjacent episcleral tissue. There is no secretion, and

nodules do not form in the sclera, but the affection disappears without a trace in a few days, to recur at regular intervals varying from some weeks to several months. The affection usually lasts several years and therapy is usually fruitless. It mostly affects men of middle age.

Of these cases reported by HARLAN (268) one is from his own clinic, one from Dr. Oliver's, and one from Dr. Risley's. In Harlan's own case the cilias, four in number, were carried into the eye by a wire used in baling hay. One was removed from the corneal cicatrix three months after the injury, the other three later by opening the anterior chamber and seizing them with a pair of forceps, an iridectomy being made. In the other cases no attempt, at the time of reporting, had been made to remove them. BURNETT.

Sections XII.–XXI. Reviewed by Dr. SILEX.

XII.—IRIS.

269. FAGE. Iritis of nasal origin. *Soc. franç. d'opht.*, 1895, and *Ann. d'ocul.*, cxiii., p. 341.

270. MACHEK. On herpes zoster of the iris in the course of herpes zoster frontalis. *Arch. f. Augenheilk.*, xxxi., p. 1.

271. STIEL. A case of iris tuberculosis. *Münch. med. Wochenschr.*, No. 4, 1895.

272. BACH. Observations on tuberculosis of the eye. *Ibid.*, No. 18, 1895.

273. DENTI and RAMBOLOTTI. Clinical, anatomical, and experimental contributions to the subject of primary tuberculosis of the uveal tract. *Ann. di Ottalm.*, xxiii., 6, p. 490.

274. AHLSTRÖM. Traumatic aniridia without injury to the lens. *Beiträge z. Augenheilk.*, xvi.

275. SEGGEL. A further case of unilateral reflex iridoplegia. *Arch. f. Augenheilk.*, xxxi., p. 63.

FAGE (269) observed a case of bilateral iritis in a man of twenty-two, who, besides an atrophic ozæna, had no affection that might have caused the iritis. Löwenberg's bacillus was found in the nose and conjunctival sac almost in a state of pure culture. SULZER.

MACHEK (270) followed a case of herpes of the iris that developed in a man of fifty, with a hemorrhagic herpes zoster

ophthalmicus. There was first pain, followed by hyperæmia and inflammation of the iris with slight plastic exudation, then localized swelling of the iris tissue with necrosis of the swollen part and hemorrhage from the ruptured vessels, and finally healing by cicatrization. The resorption of the blood and the healing required three months.

In BACH'S (272) first case reddish and grayish-yellow nodules developed in the periphery of the cornea and finally passed off, leaving a white opacity. In the second case there was primary disease of the choroid and retina. Later, iritis developed and nodules appeared in the ligamentum pectinatum and the periphery of the cornea. As all other etiological factors could be excluded it was thought that the affections were tuberculous.

DENTI and RAMBOLOTTI (273) describe three cases of tuberculosis of the uveal tract. In two the eye was enucleated. Koch's bacilli were not found in the tissues, but developed in the eyes of rabbits that were inoculated. DANTONE.

XIII.—CHOROID.

276. ROMANO–CATANIA. Ossification of the eyeball. *Arch. di Ottalm.*, ii., 11, p. 345.

277. GUAITA. Myoma of the choroid. *Ann. di Ottalm.*, xxiv., 1, p. 25.

277 a. WOOD, CASEY A. A case of septic embolism affecting the right eye, the result of pyæmia. *Med. News*, April 27, 1895.

ROMANO–CATANIA (276) describes two cases of bone formation in the eye. In one eye there had been traumatic irido-cyclo-choroiditis ten years before the enucleation. There were two masses of bone, one springing from the choroid and occupying the vitreous chamber, and one was within the capsule of the lens. In the second eye there had been a perforating ulcer of the cornea, and two small plates of bone were found in the fibrinous mass filling the ball. Both eyes were enucleated on account of sympathetic ophthalmia. DANTONE.

The tumor in GUAITA'S (277) case was 8 *mm* long, 5 *mm* broad, and 1½ to 2 *mm* thick, and extended from the ora serrata to the equator. Microscopic examination showed it to be a myoma developing from the choroid.

WOOD'S (277 a) case was a man of twenty-eight who was most probably infected through a "weather crack" in his left hand.

The general features of pyæmia were present and in addition a panophthalmitis on the right side which set in on the tenth day after the primary disease made its appearance. The patient died; no autopsy was procured. BURNETT.

XIV.—GLAUCOMA.

278. PARINAUD. Posterior sclerotomy and sclerotomy in glaucoma. *Ann. d'ocul.*, cxiii., p. 305.

279. DE VINCENTIIS. On the mechanism of the action of iridectomy in glaucoma. *Lav. di clinica ocul. d. R. Univer. di Napoli*, iv., 2, p. 181.

280. INDOVINA. Stretching the external nasal nerve in glaucoma. *Arch. di Ottalm.*, ii., p. 255.

281. PICCOLI. On anterior synechiatomy with a new synechiatome. Clinical note. *Lav. d. clin. ocul. di Napoli*, iv., 2, p. 154.

282. COHN, H. On the treatment of glaucoma with eserine. *Berl. klin. Wochenschr.*, No. 21, 1895.

283. SILEX. On the treatment of glaucoma. *Deutsche Aerztl. Zeitung*, No. 14, 1895.

284. FISHER, FRANK. Acute glaucoma in a child of twelve years, caused by atropia. *Wills Eye Hospital Reports*, Jan., 1895.

285. ZENTMAYER and POSEY. Comparative value of the administration of eserine and the performance of iridectomy in the treatment of simple glaucoma, based on the clinical observation of 167 cases. *Ibid.*

286. LEWIS, F. N. Glaucoma following cataract extraction and keratonysis. *Manhattan Eye and Ear Hospital Reports*, Jan., 1895.

PARINAUD (278) under the name sclerotomy describes the following operation: By means of a small chalazion hook and a linear knife a small flap of sclera is removed, nearly or quite exposing the choroid. The point of the knife is then passed into the wound, furnishing an exit for the intraocular fluid.

SULZER.

DE VINCENTIIS (279) assumes as the cause of the increase in intraocular tension an adhesion of the ciliary margin of the iris to the cornea (peripheric anterior synechia) and the consequent disturbance of filtration. The incision of the iris angle, as pro-

posed by the author in 1870, breaks up the adhesion and removes the obstruction to filtration so that the tension returns to the normal. DANTONE.

INDOVINA (280) reports 13 cases of glaucoma treated after Badal's method of stretching the external nasal nerve. He concludes that the operation is an excellent palliative measure against the great pain of glaucoma and is especially useful in painful absolute glaucoma. It may also be indicated in acute glaucoma, its performance here allowing the iridectomy to be delayed until the eye is quieter. DANTONE.

PICCOLI (281) speaks of the relation of peripheric anterior synechiæ to glaucoma and of De Vincentiis's new operation, describing a sickle-shaped instrument for performing the operation more readily. DANTONE.

COHN (282) gives eserine to every patient with glaucoma. This often cures acute attacks and holds chronic cases in check. When it is not successful in its action iridectomy must be done, but the prognosis is only moderately favorable.

SILEX (283) sees many eyes blinded from eserine, which further causes operative complications or allows the patient to postpone operation until too late. He therefore advises immediate iridectomy in inflammatory glaucoma, and uses eserine only in exceptional cases such as those in old and decrepit individuals.

In the case reported by FISHER (284) a child of twelve years was needled for soft cataract under atropine. That same night there was much pain and increased tension. Under eserine these symptoms subsided. Later homatropine was used for this and also for the other eye without any bad effect, but a drop of atropine solution being put accidentally into the eye, symptoms of acute glaucoma again manifested themselves. BURNETT.

The cases reported upon by ZENTMAYER and POSEY (285) were from the service of Drs. Norris and Oliver. When the drug was well borne eserine caused an increase of the central visual acuteness in 62.12 % of the cases; in 21.62 % it remained the same, and in 16.21 % it diminished. In the cases where an iridectomy was done the central vision was increased in 60 % of cases, remained the same in 20 %, and in 20 % diminished. From this the authors drew the conclusion that eserine should first be tried and an iridectomy resorted to only when the drug fails to benefit.

Neither iridectomy nor eserine exert much influence on the visual field, but the tension was modified by both. In all but 10% by iridectomy and 20% by eserine the diminution of tension was noted. BURNETT.

LEWIS'S (286) patient was a Jew on whom Foerster's operation for ripening cataract had been performed before extraction. Three weeks after extraction a division of the capsule was done, followed by some iritis. V was $\frac{20}{70}$. Six weeks after there were symptoms of glaucoma. T + 2 and contraction of visual field and some pain. Some capsule was found to be engaged in the wound. This was divided with a Græfe knife. Some reaction followed, but the case finally ended with V = $\frac{8}{200}$ with no signs of glaucoma. BURNETT.

XV.—SYMPATHETIC OPHTHALMIA.

287. SIMI. Sympathetic irido-cyclitis. *Boll. d'ocul.*, vol. xviii., 4, p. 28.

288. CASPAR. Sympathetic disseminate choroiditis. *Zehender's klin. Monatsbl.*, vol. xxxiii., p. 179.

289. LATTE. A contribution to the subject of sympathetic ophthalmia. Inaug.-Dissert., Leipzig, 1895.

290. RING, F. W. Sympathetic ophthalmia. *Manhattan Eye and Ear Hospital Reports*, Jan., 1895.

In SIMI'S (287) case the sympathizing eye had only perception of light with cloudy media, but after the removal of the injured eye and the use of subconjunctival injections of cyanide of mercury, the final result was good. DANTONE.

The ophthalmoscopic changes in CASPAR'S (288) case consisted of numerous small spots which were scattered over the entire fundus with the exception of the papillary and macular regions. The glistening yellowish-white patches were of varying size and had for the most part a pigmented margin.

RING (290) relates the histories of three cases of sympathetic ophthalmia in which the offending eyes were enucleated. From an examination of the enucleated balls and the clinical histories of the cases he is convinced that if there be but one method of transmission of disease from one eye to another it is by means of the ciliary nerves. Facts do not substantiate the migratory micro-organism theory. BURNETT.

XVI.—LENS.

291. POLJAKOFF. On the origin of lamellar cataract. *Notizen der Gesellsch. der Tersch. Aerzte*, part 1.

292. WICHERKIEWICZ. On the operation for secondary cataract. *Soc. franç. d'opht.*, annual meeting, 1895; *Ann. d'ocul.*, cxiii., p. 356.

293. DRANSART. On the removal of cortical masses after extraction, by means of injection and aspiration. *Ibid.*, p. 347.

294. ANTONELLI. The optical correction of eyes operated for cataract. *Ibid.*, p. 359.

295. BUSINELLI. On the choice of methods and procedures in the extraction of cataract. *Ball. d. R. Accad. Med. di Roma*, xxi., 1.

296. PAGENSTECHER. On glaucoma after cataract extraction. *Zehender's klin. Monatsbl.*, xxxiii., p. 139.

297. FRANCISCO. Summary of cataract operations from Oct., 1893, to Oct., 1894. *New York Eye and Ear Infirmary Reports*, Jan., 1895.

298. ECLETT and PARKER. Report of a series of cataract extractions performed at the hospital. *Wills Eye and Ear Hospital Reports*, Jan., 1895.

299. FINK, G. H., Surgeon-Captain Indian Medical Service. Methods of operating for cataract.

300. WEBSTER. Report of 118 cataract extractions. *Manhattan Eye and Ear Hospital Reports*, Jan., 1895.

301. JACKSON and SCHNEIDEMAN. Limitation, subsidence, and disappearance of opacity after injury to the crystalline lens. *Wills Eye and Ear Hospital Reports*, Jan., 1895.

In two cases of trauma, one a hyphæmia after a blow on the eye, the other a bruising of the lids and conjunctiva and a partial detachment of the retina after a blow, POLJAKOFF (291) observed a circular opacity of the lens similar to the margin of a lamellar cataract 4-5 *mm* in diameter, and some radiating spiculæ. The opacities disappeared in a few weeks. The author considers the circular opacity to be the analogue of lamellar cataract in consequence of mechanical shifting of parts of the lens.

HIRSCHMANN.

ANTONELLI (294) believes that for the accurate correction of post-operative astigmatism, ophthalmometric examination is indispensable. Since, as is known, a lens with one surface spherical and one cylindrical has a different optical value from the biconvex glass and the cylinder placed a certain distance apart in the ordinary trial-frame, he has had made up a trial case for cataract patients in which the usual sphericals are combined with various cylinders. SULZER.

PAGENSTECHER (296) makes two groups: (1), glaucomatous processes which directly follow operation, and (2), such as develop after full healing. All forms of glaucoma may come on. Miotics and salicylate of soda should first be used, and if these fail operative proceedings should be resorted to. In three cases he obtained a successful result by puncturing the anterior chamber. Glaucoma in aphakic eyes that have had good vision for a time, should be treated by sclerotomy, or if necessary by iridectomy. In such cases the glaucoma is a fresh process which must be treated exactly as if the eye had not been previously operated upon.

There were 124 extractions of cataract at the N. Y. Eye and Ear Infirmary (297) during the year. Of these 73 % were simple, 21 % with iridectomy, 6 % linear and needlings. Percentage of prolapse in simple extractions 14 %, in extractions with iridectomy 11½ %. Of results, V = o in 2 %, V = $\frac{1}{\infty}$ in 6 %. The rest ranged from $\frac{20}{100}$ to $\frac{20}{15}$. BURNETT.

In the Wills Eye Hospital Reports there are tabulated 164 cataract extractions (298), 73 simple, 78 combined, and 13 with preliminary iridectomy. In a number of cases irrigation of the anterior chamber was practised, and with satisfaction in most cases. Of the 11 failures 4 were from inflammatory reaction, 3 from occluded pupil, 1 from shrunken ball. There were 3 from infection at or near the time of operation. The results from the simple and combined operation are practically the same. BURNETT.

Description (299) of 500 cases, no visual results given, suppuration 2.8 %.

WEBSTER (300) does the simple extraction as a rule. Of the 118 cases there was success in 104 (88 %), partial success in 8 (6 %), failure in 6 (5 %). Incarceration of iris in wound occurred 5 times, prolopse of iris 11 times, iritis occurred 8 times, prolapse of vitreous 4 times. BURNETT.

The authors (301) give the histories of five cases on which they base their conclusions that perforations of the capsule and disturbance of the lens substance may be followed in the human eye by a permanent healing without any opacity or an opacity strictly limited to the part injured. The wounds in the capsule, however, must be strictly linear or very small and strictly aseptic, in order to have this result. BURNETT.

XVII.—VITREOUS.

302. DENIG. Anatomical condition found in cases of spontaneous formation of connective tissue in the vitreous (retinitis proliferans). *Arch. f. Augenheilk.*, xxx., iv., p. 312.

In the right eye of a patient of sixty-two, DENIG (302) saw two days before her death the usual picture of retinitis proliferans. Microscopically he found atheromatous disease of the vessels, with hemorrhage, Iwanoff's œdema of the retina characterized by the formation of cavities and the hypertrophy of Müller's fibres, and a very vascular connective-tissue new-formation in the vitreous. The vascular disease leads to disturbance of nutrition in the retina and hemorrhages, which latter give rise to the development of connective tissue with the assistance of the retinal vessels.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

303. LIEBRECHT. Retinitis punctata albescens. *Zehender's klin. Monatsbl.*, xxxiii., p. 170.

304. HIRSCHBERG. On retinal inflammation with congenital syphilis. *Deutsche med. Wochenschr.*, Nos. 26 and 27, 1895.

305. VIALET. Retinal hemorrhages in a hemophile. *Ann. d'ocul.*, cxiii., p. 357.

306. TRAUTAS. Annular scotoma in a case of retinitis pigmentosa. *Rec. d'opht.*, June, 1895.

307. GALEZOWSKI. On detachment of the retina and its treatment. *Ann. d'ocul.*, cxlvi., p. 337.

308. TEILLAIS. Double detachment of the retina in a child of four. *Ibid.*, p. 338.

309. SIMI. Detachment of the retina. *Boll. d'ocul.*, xvii., 3, p. 19.

310. De Vincentiis. Extraction from the interior of the eye of a foreign body that had the appearance of a subretinal cysticercus. *Lav. d. clin. ocul. d. R. Univers. di Napoli*, iv., 2, p. 189.

311. Dahms. On homonymous hemichromatopsia, with the report of a case. *Inaug.-Dissert.*, Leipsic, 1895.

312. Achenbach. A case of epithelial xerosis, with hemeralopia, in a child of nine. *Berl. klin. Wochenschr.*, No. 24, 1895.

313. Beaumont. Albuminuric retinitis; pregnancy; death. *Brit. Med. Jour.*, April, 1895, p. 867.

314. Snell. On the relation of retinitis albuminurica to the induction of premature labor. *Ibid.*, June, 1895, p. 1368.

315. Marple. A contribution to the pathology of embolism of the central artery of the retina. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1893.

316. Coleman, W. F. An argument for amblyopia ex anopsia in convergent strabismus. *Annals of Ophth. and Otol.*, April, 1895.

Liebrecht (303) reports four cases of retinitis punctata albescens, the disease that has a certain similarity with retinitis pigmentosa. The disease appeared in four children of a family, otherwise healthy, between the years of fifteen and twenty. The vision gradually grew worse, but contraction of the field and hemeralopia were not present. Ophthalmoscopically, hundreds of white spots were seen scattered over the fundus.

Hirschberg (304) gives a detailed description of the inflammatory retinal changes found in infants of five to eighteen months with congenital syphilis. In fresh cases the disc is blurred, there are small light spots in the retina which become pigmented later, a dark-gray coloring of the centre of the retina, and patches of red, white, or black color in the periphery. After the clearing up of corneal opacities in later life he found regularly choroidal and retinal changes in the periphery. Mercurial treatment is beneficial in the early stages.

Vialet (305) observed a patient in whom hemophilia had caused hemorrhages in the retina and vitreous. The father and grandfather of the patient had both been hemophiles, and he had suffered all his life from nasal hemorrhage, and at the age of twenty-nine had lost his right eye from hemorrhage into the

vitreous. Eight years later the left eye was found to have numerous hemorrhages at the posterior pole. These were round or oval, all of a size, and mostly in connection with vascular twigs. SULZER.

TEILLAIS (308) saw marked disturbance of vision in a boy of four with whooping-cough. The whooping-cough was complicated with subconjunctival extravasations, hemorrhage from the nose and ears, and suffusion of the skin. In both eyes there were detachment of the retina and opacities of the vitreous, as well as white patches in the retina. The latter, as well as the opacities in the vitreous, seemed to be the result of hemorrhages. SULZER.

SIMI (309), in a case of fresh detachment of the retina, tried electrolysis, as recommended by Gillet de Grandmont, and used a current of 5 MA. for 60 seconds. Two weeks later the same current was used for 70 seconds. There were marked signs of reaction on the part of the iris and vitreous, and the exudation disappeared, but the detached portion of the retina remained opaque, and was sharply limited from the healthy portion of the retina by a pigmented line. DANTONE.

DE VINCENTIIS (310) operated on a small detachment of the retina which he had been led by the ophthalmoscopic appearance to consider a dead cysticercus. No cysticercus was found, but a partially pigmented tumor, which histologically was recognized as a product of the pigment epithelium analogous to the hyaline excrescences of the choroid. The retina became reattached and good vision was preserved. DANTONE.

In many cases of bilateral typical xerosis of the conjunctiva ACHENBACH (312) found well-marked hemeralopia, which improved as the xerosis grew better. He therefore regards hemeralopa as a symptom of xerosis.

BEAUMONT'S (313) patient was aged twenty-one, and when first seen had albumenuric retinitis as the first symptom ; urine loaded with albumen. A month later she was married. In the meantime V of left eye had improved from $\frac{6}{12}$ to $\frac{6}{9}$, the neuritis and white plaques having disappeared. She was again seen in three months. She felt quite well, but there was the stellate appearance of white spots in the right eye ; $V = \frac{6}{15}$; Left eye $\frac{6}{9}$ still. She died suddenly three months later, having been pregnant for six months.

SNELL (314) records a case in which vision was seriously impaired (R = fingers, L = $\frac{1}{60}$) by albuminuric retinitis, but was much improved by induction of premature labor (R = $\frac{5}{60}$, L = $\frac{5}{18}$). After a second pregnancy vision again became affected, and abortion at the second month was induced, with restoration of sight as before. The optic discs were white and the vessels attenuated. The author discusses the question as to the frequency with which abortion may be resorted to in the same patient. He recommends induction of labor if retinitis occur before or at the sixth month, and asks whether removal of the ovaries might not be indicated in certain cases.

MARPLE (315) has had the opportunity of examining an eye, enucleated on account of glaucoma, that had been the seat of an embolism of the central artery of the retina seven weeks before enucleation. The eye was hardened and sections of the nerve were made consecutively backward from immediately behind the globe. The embolus was found immediately back of the lamina cribrosa, and measured $\frac{1}{4}$ *mm* in length and $\frac{1}{8}$ *mm* in thickness. The plug can be sharply distinguished from the walls of the vessel, showing that it had been carried there. The patient had heart disease. There were no material changes in the retina except in the ganglion and fibrillary layers. The rods and cones were unaffected. Several fine photographs illustrate the paper.

BURNETT.

After going over the literature of the subject *pro* and *con*, COLEMAN (316) tabulates seventeen cases of internal squint, showing the vision in the squinting eye before and after operation. In eighteen eyes which showed subnormal vision on first examination, vision after operation remained the same in five, increased 25 % in three, 50 % in five, 100 % in four, and 300 % in one.

BURNETT.

XIX.—OPTIC NERVE.

317. BERNHARDT. On the occurrence of optic neuritis in tabes. *Berl. klin. Wochenschr.*, No. 28, 1895.

318. ROKOWICZ. A case of bilateral choked disc and unilateral paralysis of the abducens in otitic meningitis. *Zehender's Klin. Monatsbl.*, xxxiii., p. 163.

319. DE VINCENTIIS. On the removal of a tumor of the optic nerve with preservation of the eyeball. *Lav. d. clin. ocul. d. R. Univers. di Napoli*, iv., 2 p. 175.

320. AHLSTRÖM. Tumor of the optic nerve (sarcoma with myxomatous degeneration). *Beiträge z. Augenheilk.*, xvi.

321. LODATO. A case of amaurosis from symmetrical arteritis of the central artery of the retina in interstitial nephritis. *Arch. di Ottalm.*, ii., 11., p. 361.

322. WESTHOFF. Hereditary retrobulbar optic neuritis. *Centralbl. f. Augenheilk.*, xix., p. 168.

323. BECK. Blindness of both eyes from retrobulbar neuritis; recovery. *Inaug.-Dissert.*, Berlin, 1895.

In a case of beginning tabes BERNHARDT (317) saw bilateral optic neuritis come on with headache, giddiness, and vomiting. The neuritis and the other symptoms not tabic disappeared under the use of iodide of potassium, from which he concluded that the patient has a syphilitic meningitis as well as tabes.

In ROKOWICZ'S (318) patient, a boy of eleven, the abducens paralysis disappeared a day after the ear operation, and the papillitis six days later. This speaks against an inflammation of the nerves, and in favor of an inflammatory increase in subarachnoid fluid which caused an œdema of the disc.

DE VINCENTIIS (319) removed a retrobulbar tumor springing from the optic nerve and extending from the optic foramen to the ball. The latter and 8 *mm* of optic nerve were left. Recovery was rapid and the eye preserved its normal appearance.

DANTONE.

LODATO (321) observed in a case of Bright's disease a complete bilateral amaurosis, which persisted up to the death of the patient a year later. Ophthalmoscopically there was the appearance of complete obliteration of both central arteries, as after embolism. On account of the bilateral nature and slow development of the affection, the author believes the cause not to have been embolism, but an inflammation of the middle coat of the artery leading to gradual occlusion, a morbid process which is seen in other arteries. DANTONE.

WESTHOFF (322) was able to trace optic neuritis through three generations, only the males of the female line being affected.

BECK (323) records the case of a laborer of thirty-seven, who was completely blind in the right eye, and had only perception of light in the left with normal fundus. Diaphoretic treatment

brought his vision up to $\frac{1}{3}$ in each eye. In a case of retrobulbar neuritis there was only perception of light, but finally V = $\frac{6}{15}$ was obtained.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

324. PURTSCHER. On the value of magnet-extraction. *Centralbl. f. Augenheilk.*, xix., p. 98.

325. GUIBERT and BLE. An attack by robbers; blows and severe wounds. Arterio-venous aneurism of the right orbit. Atrophy of the left optic nerve, followed by an inability to do continued work. *Arch. d'opht.*, xv., 4, p. 229.

326. LODATO. The prognosis of ocular injuries from fire-arms. *Ann. di Ottalm.*, ii., 9–10, p. 316.

327. SCHMIDT. On injuries of the eyes, with special reference to injuries by cow-horns. *Inaug.-Dissert.*, Giessen, 1895.

328. OLIVER. Removal of a piece of steel from the iris by an electro-magnet, with restoration of vision to the normal. *Wills Eye Hospital Reports*, Jan., 1895.

329. NETTLESHIP. Case of amaurosis after injury to the head. *Ophth. Review*, xiv., p. 97.

330. CURRY, G. E. A clinical report of a series of cases of injury to the eyeball. *Wills Eye Hospital Reports*, Jan., 1895.

PURTSCHER (324) records 8 cases in which he sought to remove splinters of iron from the vitreous by means of Hirschberg's electro-magnet. In 2 the iron was not removed. Of the 6 others, he obtained good vision in 2, recognition of the movement of the hand in 1, perception of light in 1, and atrophy of the ball in 1.

LODATO (326) reports on 10 cases of gunshot injury, in which shot had penetrated the eye without causing either panophthalmitis or sympathetic ophthalmia.

In OLIVER'S (328) case, a bit of steel was removed from the iris two days after the accident, by means of the electro-magnet, with a strength of 20 cells. There was no reaction to speak of, and the eye was restored to normal vision. BURNETT.

NETTLESHIP (329) records 3 cases: in the first blindness came on suddenly two hours after a fall on the head, unaccompanied by other head symptoms. Condition twenty-three years after: slight contraction of fields, pale gray discs, V = $\frac{6}{60}$ in R and $\frac{6}{15}$

in L. Unconsciousness and epistaxis occurred in the second case. V of R eye = p. l., which rapidly improved ; no ophthalmoscopic signs. Appearances resembling embolism of the central artery were seen in another case.

CURRY (330) gives the histories of 11 cases of injury to the eyeball of various kinds. In only two of the cases was the globe removed, yet quite a number of them would, under the old method of treatment, have been condemned to enucleation. The author argues for time in dealing with eye injuries, and thinks a vast deal can be accomplished by rest in bed, atropine and acid compresses. BURNETT.

XXI.—OCULAR AFFECTIONS IN GENERAL DISEASES.

331. KONIG. Ocular complications of diabetes. *Soc. franç. d'opht.*, cxiii., p. 365.

332. NORSA. Secondary leprous iritis. *Boll. d'ocul.*, xvii., 2, p. 13.

333. WINTERSTEINER. On leprous disease of the eye. *Wiener klin. Wochenschr.*, No. 19, 1895.

334. ABADIE. The grave ocular manifestations of syphilis and their treatment. *Ann. d'otol.*, cxiii., p. 351.

335. MAGGIO. A case of multiple affection of the cerebral nerves, of basilar origin. *Arch. di Ottalm.*, ii., 12, p. 429.

336. STUFFLER. Endocranial abscess, following retrobulbar abscess. *Ann. di Ottalm.*, xxiii., p. 483.

337. DE BONO. Quinine amaurosis and amblyopia. *Arch. di Ottalm.*, ii., 7–8, p. 227 (conclusion).

338. VALUDE. Ischæmia of the retina and optic-nerve atrophy after cardiac injury. *Ann. d'ocul.*, cxiii., p. 266.

339. ROHMER. The effect of lightning on the eye. *Arch. d'opht.*, xv., 4, p. 209.

340. GUIBERT. Aneurism of the internal carotid at the level of the left cavernous sinus ; communication with the right sphenoidal sinus ; nasal hemorrhages ; death, autopsy. *Ann. d'ocul.*, cxiii., p. 314.

341. ANGELUCCI. Again the manner of demented and aged painters. *Arch. di Ottalm.*, ii., 12, p. 389.

342. AEGELUCCI. On the clinical entity of the so-called ophthalmic hemicrania of Charcot. *Ann. di Ottalm.*, ii., 9–10, p. 313.

343. BERGER. Hysterogenic zones of the visual organ. *Arch. d'opht.*, xv., 3, p. 362.

344. THOMAS, J. L. A case of acromegaly with Wernicke's differential symptoms. *Brit. Med. Journ.*, June, 1895, p. 1198.

345. RANSOM. Notes of two cases of acromegaly. *Ibid.*, p. 1259.

346. REBER, WENDELL. Is the physiognomy of the fundus oculi in epilepsy characteristic? *Annals of Ophth. and Otol.*, April, 1895.

Among 500 diabetes patients, KÖNIG (331) found in 56, ocular complications as follows: cataract, 10; disturbances of accommodation, 20; gangrene of the lids, 2; hemorrhagic glaucoma, 2; poliencephalitis superior, 2; atrophy of the optic nerve, 2; and retinitis, 3. SULZER.

In the case of lepra observed by NORSA (332) in Egypt, the nodules about the size of a pea, that had developed in the sixth year of the disease, were located in the episcleral tissue, near the outer corneal margin, and produced, according to the author's view, a secondary iritis with adhesions and pupillary deposits.

DANTONE.

In WINTERSTEINER'S (333) case of lepra, there were numerous small nodules about the vessels of the skin of the lid and about the sweat glands, as well as scleritis, episcleritis, and iridocyclitis. In all these places there were lepra cells with bacilli.

MAGGIO (335) records a case of multiple syphilitic paralysis of the cerebral nerves. On the left side the first, second, third, fourth, fifth, seventh, and eighth nerves were affected, and on the right side the second and sixth. The lesion was supposed to be in the right middle fossa, and also to a less extent in the left. The symptom complex disappeared under energetic anti-syphilitic treatment except as regards the optic nerves.

DANTONE.

The case reported by STUFFLER (336) is of great interest. A few days after the opening of an extensive orbital abscess coming on with general symptoms in an infant of eighteen months, a fluctuating tumor was found in the parietal region of the same

side, and by incision a quantity of pus was evacuated. Examination with the finger showed that the bone was necrotic, and a considerable piece of bone was detached and removed. More pus escaped after removal of the bone, and the dura mater felt swollen. Both abscess cavities healed up, and the child recovered perfectly. Only staphylococci were found in the pus.

DANTONE.

At the close of his excellent paper on quinine amblyopia and amaurosis DE BONO (337) remarks that histological examination of the eyes of animals poisoned with quinine shows only vascular changes in the choroid and changes in the central vessels, but none in the retina and optic nerve. He believes that the ischæmia is not the sole cause of the functional disturbances, for the latter may disappear while the ischæmia remains unchanged. The visual disturbance from quinine can then be due only to changes brought about in the percipient end-elements of the optic nerve. In favor of this view speak the presence of quinine in the aqueous humor and the lack of movement in the pigment molecules of the pigment epithelium in frogs poisoned with quinine. That the vascular contractions do not depend upon the sympathetic nerve is shown by the fact that excision of the cervical ganglion of the sympathetic, narrowed the dilated pupil and lessened the calibre of the retinal vessels in a dog poisoned with quinine.

DANTONE.

After a severe contusion in the cardiac region, there was weakness and irregularity of the heart's action. On awaking from a syncope of several hours' duration, the patient, a man of thirty-six, noticed a considerable disturbance of vision. Two weeks later the nervous symptoms and the weakness had disappeared, but the patient could only see to count fingers. VALUDE (338) found the ophthalmoscopic picture that is seen with embolism of the central artery. SULZER.

ROHMER (339) speaks of the changes in different parts of the eye that are known to follow lightning strokes, and records the case of a boy of twelve who fell after lightning had struck near him, and was affected with trembling of the legs, and a year after by failure of vision due to atrophy of the optic nerves. Rohmer calls attention to the similarity of the action of lightning and the electric light on the cornea and conjunctiva.

V. MITTELSTÄDT.

GUIBERT (340) observed the following interesting case of aneurism of the cavernous sinus. A young man fell on a fork, causing a perforating wound of the right eye and a complete ophthalmoplegia of the left. The injured eye was enucleated. In the following four months there was headache on the left side and the nose bled frequently. After the third month the mobility of the left eye became normal. There was no change in the fundus and no bruit could be heard with the ophthalmoscope in the empty orbit. At the autopsy the sella turcica was found to be splintered and there was an aneusism of the carotid in the left cavernous sinus. SULZER.

According to ANGELUCCI (341) insanity in the beginning produces the same disturbancss in painters as old age. The delicate color-perception is lost, the brush is handled less lightly. Later the drawing suffers, the conception of the idea is illogical, the artist's personality is less conspicuous, and the pigments are laid on too thick. Finally the feeling for drawing, which never suffers in age, is lost in the insane. The author was able to trace these changes in the work of a gifted painter affected with paralytic dementia, who made copies to order of his earlier pictures.

DANTONE.

From the observation of twenty cases of Charcot's ophthalmic migraine, ANGELUCCI (342) concludes that it is not a particular form of disease, only coming on with paralysis of the oculomotor nerve. The pains are almost always the forerunners of paresis or paralysis of the ocular muscles if the cause is of apoplectic or encephalic nature. They frequently cease when softening occurs and come on when these processes spread.

DANTONE.

BERGER'S (343) patient was an hysterical young man who, after reading a short time, was affected with pain in the left side of the head and face and with singultus. After correction of his astigmatism the patient seemed to be able to read longer, but the pain seemed to be brought on by the light irritation of the retina which was the hysterogenic zone, and after bandaging the left eye little difficulty was experienced. There was contraction of the field for white and colors and reversal of the color fields.

V. MITTELSTÄDT.

The patient, whose case is detailed by THOMAS (344), was a girl, æt. eighteen. In addition to the usual symptoms of acro-

megaly, the right eye was blind, the left was hemianopic on the temporal side ; both discs were pale, more especially the right ; pupils did not contract on throwing light on the insensible half of the left retina. Three months later the right eye improved, producing bitemporal hemianopsia.

RANSOM (345) records two cases of acromegaly in women, æt. forty-seven and thirty-four respectively, in both of which there was diminution of visual acuteness with pallor of the optic discs and bitemporal hemianopsia, incomplete in one case, and accompanied with central scotoma in one eye in the other case. In the latter the pupil of one eye was slightly larger than in the other, and hardly contracted when the light fell on the nasal portion of the retina.

REBER (346), after an examination of about one thousand epileptics, has found that in most cases every character of the fundus was such as is presented by persons not epileptic.

BURNETT.

BOOK NOTICES.

I. E. MEYER. **Traité Pratique des Maladies des Yeux.** Quatrième Edition, G. Masson, Paris, 1895.

This popular text-book of the orthodox VON GRÄFE school keeps pace with the advance of science. It is an excellent presentation of the modern status of ophthalmology, holding fast what is firmly acquired in the practice of ophthalmology, neither ignoring nor unreservedly endorsing the many new devices of late years. H. K.

II. A. TROUSSEAU. **Traitement des Maladies des Yeux.** Notions Pratiques. Gustave Doin, Paris, 1895. 12mo., 163 pages. Price, 3 frs.

This little volume is pleasant reading. We heartily concur in most of the author's recommendations; to some few points we would object—for instance, to the caustic treatment of contagious purulent ophthalmia at its initial stage, and to the abscission of a prolapse of the iris during the stage of virulent secretion.

H. K.

III. PAUL LEFERT. **La Pratique des Maladies des Yeux dans les Hôpitaux de Paris.** 1895.

It is a very welcome gift to oculists all the world over to receive a handy book describing the treatment of all eye diseases by the representative oculists of Paris. On 324 12mo pages we may find how students of special subjects treat one disease to which they have paid particular attention, and on the other hand how men of vast general experience and world-wide reputation, such as Panas, De Wecker, Galezowski, Valude, etc., treat every thing. The little book is arranged like a general index, according to subjects and authors. If you want to know, for instance, how conjunctivitis in its different forms is treated, our author tells you first how Panas treats it, then what treatment is preferred by Lannelogue, Duplay, Constantin, Paul, Kirmisson, Galezowski, De St. Germain, Abadie, etc.

If, however, you desire to know the treatment of the particular diseases to which DE WECKER or any other prominent man has given particular attention, or on which he holds original views, you have but to look up his name in the index, and at a glance you can find out all the diseases with which his name is connected.

H. K.

IV. J. H. CLAIBORNE, JR. **The Functional Examination of the Eye.** 8vo, 96 pages. The Edwards & Docker Co., Philadelphia, 1895. Price $1.00

This book is the result of a course of lectures delivered for a number of years at the New York Polyclinic, and more particularly of a course in practical instruction given by the author in the College of Physicians and Surgeons. The little treatise is very handsomely gotten up, quite elementary, exceedingly clear and to the point, and though it contains nothing more, rather a deal less, than is found in every one of our numerous good text-books, it is heartily to be recommended to the freshman while pursuing a "course on refraction" at any clinic or for self-instruction.

H. K.

V. J. ELLIS JENNINGS. **Color-Vision and Color-Blindness.** A Practical Manual for Railway Surgeons. 8vo, 110 pages, with a colored plate and 21 photo-engravings. The E. A. Davis & Co., Philadelphia, 1896. Price, $1.00.

This is a well written and handsomely gotten up brochure, which gives enough on color-perception, perimetry, and optometry, for a physician to drill himself in making satisfactory examinations on sharpness and field of vision and color-perception. It is based on Holmgren's test and its modifications by Thomson, Olliver, and his pupil, the author. Some other tests are described: Stilling's pseudo-isochromatic plates, colored shadows (Meyer's & Pflüger's tissue-paper tests, contrast experiment of Ragona Scina), the spectroscope tests. Further he describes how to measure the color-sense with Donders's lantern, or Olliver's color-sense measure. A small chapter treats on acquired color-blindness from atrophy of the optic nerve, retro-bulbar neuritis, etc. The book does not lose itself in the intricacies of the natural philosophy and metaphysics of color perception, but gives a good and intelligent foundation of the special field and work for which it was planned and written—namely, to detect color-blindness in the officials of our public transportation organizations.

H. K.

VI.—J. OELLER. **Atlas of Ophthalmoscopy,** first number. J. F. Bergmann, Wiesbaden, 1896.

The first number of this impatiently looked for, large pictorial work has just come to hand. It surpasses our expectation and we do not hesitate in putting ourselves on record by declaring it to be the best that ever has been produced. JÄGER's atlas until now had been unequalled. The atlas of Oeller will consist of 75 large folio plates. The pictures of the background of the eye have all been drawn by himself, according to nature, from his own cases, with scrupulous accuracy of detail, in the erect image with the concave mirror, in the size as they appeared to the author. The original drawings are in oil, on canvas. The chromo-lithographic reproduction has been accomplished with the highest degree of perfection, thus far obtainable, by the University Press and Art Institute of M. H. SCHÜTZ, of Würzburg. Each plate is accompanied by a full description both in German and English. By all that have seen specimen copies of the plates this atlas is considered the standard pictorial work on ophthalmoscopy of the present day, and is likely to remain so for years to come. It will represent everything that is essential to the thorough teaching of ophthalmoscopy. From the plates before us we cannot speak too highly in its praise.

The price of the whole work will be about 100 marks ($25); the price to subscribers before the first number came out was 75 marks. H. K.

MISCELLANEOUS NOTES.

In the extension of the **Vanderbilt Clinic** (*i. e.*, Dispensary) of the College of Physicians and Surgeons, ophthalmology has received spacious, well appointed, and generously equipped quarters. The class of patients—between 3000 and 4000 new ones a year—under the supervision of the professor of ophthalmology, attended to by a chief of clinic and five competent clinical assistants, serves to illustrate the clinical lectures at the College, and to drill the students in ophthalmoscopy and the examination of refractive and muscular anomalies. Hospital instruction is given to the students in sections at the New York Ophthalmic and Aural Institute.

The **New York Ophthalmic and Aural Institute** has received a legacy of $500 from the estate of the late ADOLF BERNHEIMER of New York, and a donation of $5000 from Miss CHARLOTTE VAN DEN HEUVEL, for the foundation of a free bed in perpetuity, as a memorial to her deceased mother, who had been operated on for cataract.

The **Twelfth International Medical Congress** will be held in Moscow from August 19 to 27, 1897. Executive Committee: Prof. J. F. Klein, president; Prof. Kojewnikow, vice-president; Prof. Erismann, secretary-general; Prof. N. Filatow, treasurer, all of Moscow. Contribution of membership: 10 Rubel ($5). Only twelve sections have been determined on. Of the specialties, ophthalmology, otology, and laryngology have been included in the section of Surgery. French shall be the official language for all international relations. In the sections, communications and papers can be delivered in either the French, German, or Russian language. The apparent omission of the English language, if true, would be prejudicial to the interests of the Congress.—*Berl. med. Woch.*, No. 52 (Dec. 30, 1895), p. 1144.

APPOINTMENTS.

Dr. STRAUB, Professor Extraordinary of Ophthalmology at Amsterdam, Holland, has been appointed Professor in Ordinary.

Dr. H. L. SCHÖLER, Professor Extraordinary in Berlin, has received the honorary title of "Geheimer Medicinalrath" (Privy Councillor).

Dr. CARL HESS, Privatdocent of Ophthalmology in Leipzig, has received the title of Extraordinary Professor.

At the New York Ophthalmic and Aural Institute the following appointments have been made by the Board of Trustees at their January meeting: Dr. F. E. D'OENCH, Surgeon, (Eye Department). Dr. E. B. COBURN, Assistant Surgeon. Drs. ALICE A. WAKEFIELD and J. B. LYNCH, Clinical Assistants.

Dr. KOSTER has been appointed Professor of Ophthalmology at the University of Leyden, Holland.

Dr. GEO. BERRY has been appointed Lecturer on Ophthalmology at the University of Edinburgh, to succeed Dr. Argyll Robertson resigned.

Obituary.

I.—Dr. G. A. Reich, of Seattle, Washington, died at Carlsbad, Austria, at the beginning of November, 1895. He was a well-known oculist, having an extensive practice in Seattle, and had made several valuable contributions to ophthalmic periodical literature.

II.—Richmond Lennox, M.D., was born in Brooklyn, N. Y., June 28, 1861, and died at his residence, 23 Schermerhorn Street, Brooklyn, after a protracted illness, on November 14, 1895. His early education at the Brooklyn Polytechnic Institute was followed by a course in medicine at the College of Physicians and Surgeons in the city of New York, from which he was graduated in 1882. After his graduation and a term of service as interne at the Roosevelt Hospital, he applied himself to the study of the eye and ear for two years in Heidelberg, Goettingen, Vienna, London, and Paris. On his return to America he devoted himself to his profession. He was a member of the N. Y. Pathological and Ophthalmological Societies, of the American Ophthalmological Society, and of the Brooklyn Pathological Society. He also held the positions of Assistant Surgeon, Pathologist, Curator, and Microscopist at the N. Y. Eye and Ear Infirmary. At the time of his death he was one of the surgeons of the Brooklyn Eye and Ear Hospital and Attending Ophthalmic Surgeon to the Kings County Hospital.

As an ophthalmologist Dr. Lennox's death will be keenly felt by his professional brethren in Brooklyn and New York, where his unusual ability and skill were fully recognized. He was thoroughly equipped for his work, possessing not only a well-stored mind, but clear eyes and sound judgment. He was an able and rapid diagnostician and an operator of great dexterity. He was a progressive practitioner in the best sense of the word, and, had his life been spared, would have been recognized and valued as an authority in his especial branch both here and abroad. He was already known through his pen, having produced able articles on the "Development of the Crystalline Lens," on "Sarcoma of the Choroid" and "Reports on the Progress in Ophthalmology."

Dr. Lennox was married in 1886 and leaves a widow with two children.

Contents of the last numbers of the Arch. f. Aug. (German Edition of these ARCHIVES).

Vol. XXXI., No. 3. Issued October, 1895.

I.—**Originals:**

1. DÜRR. Simple Method of Obliterating the Lachrymal Sac.
2. L. BACH. The Pneumococcus in the Pathology of the Eye.
3. GUILLERY. The Relations of Space between Light-sense and Color-sense.
4. KRÜDENER. Disturbances of Circulation and Tension in Choroidal Sarcoma.
5. SCHANZ. Three Cases of Unilateral Reflex Immobility of the Pupil.
6. SCHANZ. A Corneal Microscope and a Retinal Telescope.
7. BRANDENBURG. Comminuted Fracture of the External Margin of the Orbit.

II.—**Translations** from the English Edition. By Dr. GREEF.

III.—**Report** of the Transactions of the Heidelberg Ophthalmological Society, Aug. 4 to 7, 1895.

Vol. XXXI., No. 4. Issued November, 1895.

I.—**Originals:**

1. WOLFRING. Ectropium Sarcomatosum.
2. STÜLP. Subconjunctival Injections of Bychloride of Hg Experiments.
3. WALSER. Angioid Pigmentation Stripes of Fundus.
4. DENIG. Frequency of Local Tuberculosis of Eye.
5. HORI. Ophthalmia Hepatica.
6. WEISS and GÖRLITZ. One-sided Traumatic Blindness in a Diabetic Patient.

II.—**Report on Progress.** Second quarter of 1895. First part. Translation in this number.

Vol. XXXII., No. 1. Issued December, 1895.

I.—**Originals:**

1. SCHWEIGGER. Glaucoma Malignum.
2. CASPAR. Congenital Anomalies of Optic Disc.
3. L. BACH. Cryptophthalmos in a Rabbit.
3. O. PES. Conjunctivitis Pseudomembranacea.
4. ISCHREYT. Polypoid Tumors of the Conjunctiva.
5. MELLINGER. Bad Influence of Cocain on Wounds of the Cornea.

II.—**Translations.**

G. L. JOHNSON's first paper, on the Finer Anatomy of the Macula Lutea. (By Dr. GREEF.)

III.—**Reports.** Second quarter of 1895, concluded. Translation in this number.

As a SUPPLEMENTARY VOLUME of 209 pages, with numerous illustrations in the text, was issued in November, 1895: **Festschrift** (Jubilee volume) in Celebration of Prof. R. Förster's Seventieth Birthday, by his pupils: Asmus, Magnus, Baer, Trompetter, E. Fick, Groenow, H. Wilbrand, Krienes, H. Cohn (Will be analyzed.)

ARCHIVES OF OPHTHALMOLOGY

NOTICE TO OUR READERS.

The ARCHIVES OF OPHTHALMOLOGY contain *original papers* on all branches of ophthalmic surgery, and *original reports* on the progress of ophthalmology. The original papers occupy from two thirds to three fourths of the space, and their scope embraces all subjects of scientific and practical interest connected with this department of medicine.

The object of the ARCHIVES is to guard, solidify, extend, and diffuse the stock of acquired ophthalmic knowledge by recording the constant addition of new observations, investigations, methods and means of examination, clinical experience, instruments and remedies, and further by taking part in the discussion of the questions of the day with a spirit alike conservative and progressive.

Particular attention is paid to the preparation of the Report on the Progress of Ophthalmology. The report is intended to furnish a *complete, systematic, and early* review of the current ophthalmological literature of the world. It has been necessary to divide the work of its preparation among a number of collaborators according to the following arrangement:

Dr. ST. BERNHEIMER, of Vienna.

1. *General Ophthalmological Literature:*
   a.—Text-books (not abstracts, but notes pointing out what is new and characteristic).
   b.—Monographs and papers on historical, statistical, and general subjects; reports on societies and hospitals.
   c.—Periodicals on our specialty (short notices of their character, time and place of publication, the titles of the original papers, with the names of their authors).

2. *General Pathology, Diagnosis, and Therapeutics*, including new instruments, apparatus, and remedies.
3. *Normal Anatomy and Physiology*, including color-blindness.

Dr. C. HORSTMANN, Prof. at the University of Berlin (Potsdamer Strasse 4):

1. *Anomalies of Refraction and Accommodation.*
2. *Eyelids.*
3. *Lachrymal Apparatus.*
4. *Muscles and Nerves.*
5. *Orbit and Adjacent Cavities.*
6. *Conjunctiva, Cornea, Sclerotic.*
7. *Injuries and Foreign Bodies of these parts.*

Dr. P. SILEX, Lecturer at the University of Berlin.

1. *Uveal Tract*, including glaucoma.
2. *Refracting Media*, including the lens.
3. *Retina and Optic Nerve.*
4. *Injuries and Foreign Bodies of these parts.*
5. *Ocular affections in connection with general diseases.*

In order to obtain complete and recent reviews on the non-German ophthalmological literature, special reporters have been selected for different countries, who will send monthly abstracts of all local ophthalmological publications to Dr. C. Horstmann, of Berlin, the editor of the Report. Dr. Horstmann will distribute these abstracts among the German reporters according to the above plan, in order to preserve the systematic arrangement which we think of paramount importance.

The special reporters are:

For America: Dr. SWAN M. BURNETT, 1770 Massachusetts Ave., Washington, D.C.

For Great Britain and Ireland: Dr. L. WERNER, 27 Upper Merrion Street, Dublin.

For France and Belgium: Drs. D. E. SULZER, Geneva, and P. VON MITTELSTÄDT, Metz.

For Germany: Drs. BERNHEIMER, Vienna, HORSTMANN, SILEX, and DEUS, in Berlin.

For Italy: Dr. DANTONE, Rome.

For Russia: Prof. HIRSCHMANN, Charkow.

For Scandinavia: Drs. OLE BULL and SCHIÖTZ, Christiania.

For Holland: Dr. C. A. H. WESTHOFF, of Amsterdam.

In the interest of our readers, who are scattered over the whole world—and whom, like ourselves, we desire to keep informed of all advances in ophthalmology,—furthermore in their own interest, authors of ophthalmological works are requested to send reprints, duplicates of journals, or copies for reviewing, to one of the above-named reporters, or to the editors or publishers of the Archives, according to their convenience.

The abstracts of American ophthalmological literature formerly appeared under a special head, but are now embodied in the systematic Report. Text-books may be specially noticed.

The number of good papers offered us for publication has increased to such an extent that it is no longer possible to translate all of them unabridged. Whenever a German paper is condensed in the English version, or *vice versa*, it will be so stated. Should any one of our readers wish to recur to the original, the editors will always take pleasure in sending it for reference.

Under the heading of "Miscellaneous Notes," there will be published all kinds of professional news which specially concern the oculist, *e. g.*, appointments, honors, resignations, vacancies, new ophthalmic hospitals, opportunities for instruction, prize questions and essays, announcement of Society meetings, etc. Brief notices of this kind will be thankfully received by the editors.

Original papers of value from any source will, as heretofore, be welcome to the ARCHIVES, and are solicited.

EDITORS:

H. KNAPP, M.D.,
26 WEST 40TH STREET, NEW YORK.

C. SCHWEIGGER, M.D.
ROONSTR. 6, BERLIN.

NOTICE TO CONTRIBUTORS.

The editors and publishers of the ARCHIVES beg to offer some suggestions to authors who propose to favor them with their contributions.

1. As original communications the ARCHIVES can accept only such papers as have never been printed nor are intended to be printed in other journals. If a preliminary communication on the subject of a paper has been published, the author is requested to state this in the letter accompanying his manuscript. It is understood that contributors to these ARCHIVES and editors of other periodicals will make no abstracts of the original papers published in this journal without giving it due credit for the same.

2. Authors will receive gratuitously twenty-five reprints of their articles. If a greater number is desired,—notice of which should be given at the head of the manuscript,—only the additional cost of presswork and paper will be charged to the author.

3. In preparing manuscript for the compositor it is requested that the following rules be adhered to:

a. Write on one side of the paper only.

b. Write without breaks, *i. e.* do not begin a new sentence on a new line. When you want to begin a new line or paragraph at a given word, place before it in your MS. the sign ¶.

c. Draw a line along the margin of such paragraphs as should be printed in smaller type—for instance, all that is clinical history in reports of cases, etc.

d. Words to be printed in *italics*, should be underscored once, in SMALL CAPITALS twice, in LARGE CAPITALS three times.

4. Authors may receive proofs for revision if they will kindly return them without delay. We beg however to remind our contributors that changes in the copy are equivalent to resetting, causing so much additional expense. We therefore request them, to make, if possible, no alterations at all in their MSS., or, at least, to limit these to what is of essential importance.

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